CALIFORNIA HIGH-SPEED TRAIN

Project Environmental Impact Report / Environmental Impact Statement

PRELIMINARY

Palmdale to Los Angeles Section Alternatives Analysis Report

Volume 1

July 2010

California High-Speed Rail Authority

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California High-Speed Train Project

Palmdale to Los Angeles Section Project EIR/EIS

PRELIMINARY
ALTERNATIVES ANALYSIS REPORT

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Revision	Date	Description
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ABBREVIATIONS / ACRONYMS

AA .....Alternatives Analysis

Amtrak.....National Railroad Passenger Corporation

Authority.....California High-Speed Rail Authority

BSS .....Branford Street Station (location alternative)

BVS .....Buena Vista Station (location alternative)

Caltrans .....California Department of Transportation

CDFG .....California Department of Fish and Game

CEQA .....California Environmental Quality Act

CGS.....California Geological Survey

CHSTP .....California High Speed Train Project

CNG.....Compressed Natural Gas

CNPS .....California Native Plant Society

CRHR.....Californian Register of Historic Places

CWA .....Clean Water Act

DMU .....Diesel Multiple Unit

EIR .....Environmental Impact Report

EIS .....Environmental Impact Statement

EMT.....Engineering Management Team

ESO .....East Side, Outside: a track alignment option that would place the HST tracks to the east of and outside the existing rail right-of-way. See also, ESS, WSO and WSS.

ESS.....East Side, Sharing: a track alignment option that would place the HST tracks to the east of and within (sharing) the existing rail right-of-way. See also, ESO, WSO and WSS.

FEMA.....Federal Emergency Management Agency

FRA .....Federal Railroad Administration

GIS.....Geographic Information System

HOV.....High Occupancy Vehicle

HST .....High-Speed Train

LADOT .....City of Los Angeles, Department of Transportation

LAP... .....Los Angeles to Palmdale

LA River .....Los Angeles River

LASHP.....Los Angeles State Historic Park (the “Cornfield”)

LAUS .....Los Angeles Union Station

LOSSAN .....Los Angeles to San Diego Passenger Rail Corridor

Metro (or MTA) .Los Angeles County Metropolitan Transportation Authority

Metrolink CMF . Metrolink Central Maintenance Facility

MPH .....Miles per Hour

NB.....Northbound

NEPA .....National Environmental Protection Act

NRHP.....National Register of Historical Places

PMT.....Program Management Team

RCP .....Reinforced concrete pipe

RDLASP.....Rio de Los Angeles State Park

ROW.....Right-of-Way

SB .....Southbound

SCG .....Southern California Gas Company

SCRRA .....Southern California Regional Rail Authority (Metrolink)

SR .....State Route

SWG .....Stakeholder Working Group

TM.....Technical Memorandum

TOD.....Transit-Oriented Development

USGS .....United States Geological Survey

UPRR .....Union Pacific Railroad

VCP .....Vitrified Clay Pipe

WSO.....West Side, Outside: a track alignment option that would place the HST tracks to the west of and outside the existing rail right-of-way. See also, ESO, ESS, and WSS.

WSS .....West Side, Sharing: a track alignment option that would place the HST tracks to the west of and within (sharing) the existing rail right-of-way. See also, ESO, ESS, and WSO.

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Executive Summary

ES.1 Results from the Preliminary Alternatives Analysis

This Preliminary Alternatives Analysis Report for the Palmdale to Los Angeles Section incorporates conceptual engineering information and identifies feasible and practicable alternatives to carry forward for environmental review and evaluation in the draft environmental impact report/environmental impact statement (EIR/EIS) under the California Environmental Quality Act (CEQA) and the National Environmental Policy Act (NEPA). In consideration of the varying setting and terrain covered in this Alternatives Analysis, the Palmdale to Los Angeles section was divided into four subsections from south to north:

- **Los Angeles Union Station to Metrolink CMF** – Beginning at the north end of a new High Speed Train Station in close proximity to Los Angeles Union Station and extending to the Metrolink Central Maintenance Facility (Metrolink CMF).
- **Metrolink CMF to SR2** – Beginning at the Metrolink CMF and extending to State Route 2 (SR 2).
- **SR 2 to Sylmar** – Extending through the San Fernando Valley from SR 2 to the vicinity of Bledsoe Street.
- **Sylmar to Palmdale** – Extending northeast from Bledsoe Street through the San Gabriel Mountains and terminating at the north end of a new HST station in Palmdale.

This Alternatives Analysis Report incorporates the Los Angeles Union Station (LAUS) HST alternatives from the Anaheim to Los Angeles alternatives analysis. In Palmdale, the north end of the new HST station serves as the interface to the Bakersfield to Palmdale Section. The alternatives evaluated are shown in Figure ES.5-1 at the end of this summary.

The following alignment alternatives are selected to be carried forward for detailed study in the Palmdale to Los Angeles Section HST Project EIR/EIS.

- **LAUS to Metrolink CMF**
    - Alternative LAPT1 – An alignment originating from an at-grade HST station at LAUS that includes a tunnel between Spring Street and Metrolink CMF with a cut and cover section through Los Angeles State Historic Park.
    - Alternative LAPT2 – An alignment originating from an elevated or at-grade HST station at LAUS that includes a tunnel between Broadway and Metrolink CMF.
    - Alternative LAPT3 - An alignment originating from an at-grade HST station at LAUS that includes a tunnel between Spring Street and Metrolink CMF, passing beneath Los Angeles State Historic Park in bored tunnel.
    - Alternative LAP1C - An alignment originating from an elevated or at-grade HST station at LAUS that would follow Main Street on viaduct then cross the river just north of the Main Street Bridge to the east bank of the Los Angeles River and follow the Metrolink tracks.

- **Metrolink CMF to SR 2**
    - San Fernando Road Alignment – A partially covered trench along San Fernando Road along the east side of Rio de Los Angeles State Park.
    - Metrolink Trench Alternative – A partially covered trench in the existing Metro right-of-way along the west side of Rio de Los Angeles State Park.
- **SR 2 to Sylmar**

  Alignment ESS: HST will run within the existing Metrolink/UPRR railroad corridor, sharing the right-of-way, with the dedicated HST tracks placed to the east and the Metrolink/freight tracks relocated to the west. This alignment would allow for progressively increasing speeds to the north as it follows the existing Metrolink/UPRR corridor. It would run predominantly at grade, with the following profiles to deal with existing at-grade road crossings:
    - Elevated Profile A – HST would be selectively elevated to create grade separations
    - At-grade Profile B1 – Roads would be elevated to cross over HST which would be at grade
    - At-grade Profile B2 – Roads would be depressed to cross under HST which would be at grade
    - Trench Profile C – HST would be selectively depressed to create grade separations.
- **Sylmar to Palmdale**
    - SR 14 East – An alignment that passes close to the SR 14 Highway through the Acton area and east of Palmdale Lake to follow the existing railroad right-of-way into Palmdale.
    - SR 14 West – An alignment that passes close to the SR 14 Highway through the Acton area and west of Palmdale Lake, before rejoining the existing railroad right-of-way in Palmdale north of the Palmdale Transportation Center.
- **Station Options**
    - Los Angeles – Union Station (as defined for the Los Angles to Anaheim HST project)
    - San Fernando Valley – a single station between LAUS and Palmdale at one of the following locations:
        - Burbank Buena Vista Alternative BVS - A station located in the City of Burbank between North Buena Vista Street and Hollywood Way, in close proximity to Bob Hope Airport.
        - Branford Alternative BSS – A station located between Tujunga Wash and Branford Street in the City of Los Angeles/Pacoima.
        - Pacoima Wash Alternative PWS – A station located between the SR 118 freeway and the Pacoima Wash, in the City of Los Angeles/Pacoima and immediately adjacent to the City of San Fernando.

- Sylmar/San Fernando Alternative SFS – A station location located between Maclay Street and Hubbard Avenue in the City of San Fernando.

o Palmdale

- Palmdale Station Option 1 – A station location near the Palmdale Transportation Center, applied in conjunction with the SR 14 East alignment alternative.
- Palmdale Station Option 2 – A station location near Avenue P west of the Palmdale Transportation Center, applied in conjunction with the SR 14 West alignment alternative.

Table ES.5-1 summarizes the findings and recommendations of this Alternatives Analysis for all alignment alternatives and station alternatives considered.

The Authority and the FRA, in addition to performing engineering and environmental analysis, have engaged the agencies, public and the communities throughout the corridor and continue to incorporate their input. The observations below outline some of the highlights from the work and input received to-date:

- The Quantm optimization tool was used to develop and refine the program alignments between Sylmar and Palmdale and identified alternatives to take forward which are seen by the environmental agencies to have significantly less environmental impact than the original programmatic alignment through Soledad Canyon.
- The Authority has met with the City of Santa Clarita on a number of occasions. No feasible station locations could be developed for Santa Clarita, but the city will continue to be served by Metrolink to provide connectivity to the high-speed train and to Los Angeles Union Station, in the absence of a Santa Clarita HST station.
- City of Los Angeles planners for the San Fernando Valley proposed a station location adjacent to Pacoima Wash. This location has been evaluated and is recommended to be carried forward into the draft EIR/EIS.
- The City of Burbank proposed and asked for a location either at the existing Burbank Metrolink station or close to Bob Hope Airport. Both locations were evaluated, however, only the location near Bob Hope Airport is recommended to be carried forward for detailed study in the draft EIR/EIS.
- It is recommended that there only be a single high-speed station between LAUS and Palmdale. Of the station locations evaluated and recommended to be carried forward between LAUS and Palmdale, all lie within approximately 8 miles of each other in the San Fernando Valley. Analysis has suggested that ridership numbers for the system with a single station would be similar to those when there were two stations in the San Fernando Valley. Moreover, construction costs, and operational and maintenance costs will be reduced for one station.
- Through technical working groups, the City of Los Angeles and various stakeholders expressed support for a tunneled alignment crossing the Los Angeles River north of Union Station as

causing less environmental impact and being more consistent with plans for future river revitalization. The resulting tunneled alternatives are recommended to be carried forward for the LAUS to Metrolink CMF sub-section.

- California Department of Parks and Recreation is concerned where alignments may be immediately adjacent to, pass under or otherwise impact state parks. The Authority will continue to work with California State Parks with regards to potential impacts.

ES.2 Alternatives Analysis Evaluation Measures

The alignment alternatives, station locations, and design options carried forward from initial review (Section 3.3) into detailed alternatives analysis were assessed for each of the project objectives and evaluation measures. This information was then used to identify (Section 4) alternatives that are feasible and practicable and are recommended for further consideration in preliminary engineering design and environmental review as part of the EIR/EIS. The primary evaluation measures are listed below.

- Design objectives (including measures such as travel time and cost)
- Land use (including measures such as consistency with land use and general planning)
- Constructability (including measures such as type and magnitude of construction and access to the corridor)
- Community impacts (including measures such as amount of land acquisition)
- Natural resources (including measures such as impacts to wetlands, potential threatened and endangered species habitat, and important farmlands)
- Environmental quality (including measures such as number of sensitive noise receptors)
- Additional considerations (including measures such as ability to meet project purpose and support by public and agencies)

ES.3 Palmdale to Los Angeles Section High Speed Train Project Background

The Authority and FRA previously made decisions with the HST Program EIR/EIS including selection of the MTA/Metrolink right-of-way as the preferred corridor for the LAUS to Sylmar section of the dedicated-track HST project. The MTA/Metrolink corridor was deemed to have less environmental impact, fewer constructability issues, fewer impacts on local communities, and require less right-of-way than the other corridors following the I-5 freeway that were considered.

Based on the analysis described in the HST Program EIR/EIS, the Authority and FRA selected the SR 58/Soledad Canyon (Antelope Valley) corridor as the preferred alignment for the Bakersfield to Sylmar section. Although the longer Antelope Valley alignment would increase travel times between northern and southern California and have lower intercity ridership potential than an I-5/Grapevine alignment option, it was deemed to have fewer potential environmental impacts, be less subject to seismic activity, involve considerably less tunneling and thereby fewer constructability issues, and increased connectivity and accessibility to the growing Antelope Valley region. Between Palmdale and Santa Clarita, a broad corridor was identified inclusive of both Soledad Canyon and SR 14 freeway alignments.

The preferred station locations for the HST within the LAUS to Palmdale section were identified as: LAUS (covered in the Anaheim to Los Angeles Section) Burbank, Sylmar, and Palmdale

These findings served as the baseline for this Preliminary Alternatives Analysis.

ES.4 Public and Agency Outreach Efforts

The Authority and the FRA, in addition to performing engineering and environmental analysis, have engaged the agencies, public, and the communities throughout the corridor and continue to incorporate their input. In February 2007, the Authority and the FRA began a project-level environmental review of the Palmdale to Los Angeles HST Section per requirements of CEQA and NEPA. Scoping meetings were held in March and April 2007, to receive input on the scope of issues that should be analyzed in the EIR/EIS. The meetings were summarized in the Palmdale to Los Angeles High Speed Train Project EIR/EIS Scoping Report released in July 2007. The final scoping report for the Palmdale to Los Angeles Section was issued in June 2009.
(See http://www.cahighspeedrail.ca.gov/images/chsr/20090708122502_LAPalmdaleScopingReport.pdf)

In addition, a number of meetings with agencies, elected officials, the general public, and small groups of stakeholders were held throughout the Alternatives Analysis process. The purpose of these meetings was to explain the alternatives analysis process, share the results of the preliminary studies with the public and agencies, and receive feedback.

The feedback was distilled to refine the initial concepts and develop additional alternatives, station options and design refinements for consideration in this Preliminary Alternatives Analysis Report. Feedback from the public and agencies included issues such as noise, visual impacts, vibration, community cohesion, biological impacts, project cost and funding, right-of-way, accessibility, consistency with local planning, and more.

ES.5 Next Steps

This Preliminary Alternatives Analysis Report Palmdale to Los Angeles Section informs the Project Description for the Project EIR/EIS. It also sets parameters for the next level of design (15 percent) and environmental analysis. This ongoing work will provide the Authority, FRA and the communities in the Palmdale to Los Angeles corridor more details and a fuller picture of the design options in each sub-section and a comprehensive vision of the entire corridor.

As the engineering and environmental work continues, the Authority will continue to meet and engage communities and stakeholders along the Palmdale to Los Angeles corridor in a discussion about the different alternatives. At a future Board meeting, Authority staff will briefly summarize for the Board the input received on the Preliminary AA Report. At that time staff will either recommend no change to the Preliminary AA Report or will present any recommended changes to the Preliminary AA Report. If deemed necessary by the lead agencies, a Supplemental Alternatives Analysis Report will consider feedback received on this Preliminary Alternatives Analysis Report and will discuss how the alternatives analysis will inform the further engineering, environmental and outreach activities in the Palmdale to Los Angeles corridor. These activities will inform preparation of the draft EIR/EIS, which is currently scheduled to be released for public comment in mid-2011.

Table ES-1. Alternatives Evaluation Summary

ALIGNMENT ALTERNATIVE/STATION LOCATION AND DESIGN OPTIONS	AA DECISION		REASONS FOR ELIMINATION (P–Primary S–Secondary)							ENVIRONMENTAL/OTHER CONCERNS
	Carried Forward	Withdrawn	Construction	Incompatibility	Right-of-Way	Connectivity/ Accessibility	Revenue/ Ridership	Community Impact	Environment	
LAUS to Metrolink CMF										
LAPT1	X									Impact to Los Angeles State Historic Park (LASHP); Only compatible with at-grade LAUS; Business displacements; Residential/business/institutional subsurface easements; Construction costs.
LAPT2	X									Runs alongside LASHP on viaduct; Business displacements; Residential/business/institutional subsurface easements; Visual resources; Construction impacts and costs.
LAPT3	X									Adjacent to LASHP; Only compatible with at-grade LAUS; Business/institutional displacements; Residential/business/institutional subsurface easements; Cultural resources; Construction costs
LAP1A		X	S					S	P	Residential/business/institutional displacements; Cultural and visual resources; Very low speed curves leaving Union Station; Constructability over existing rail lines.

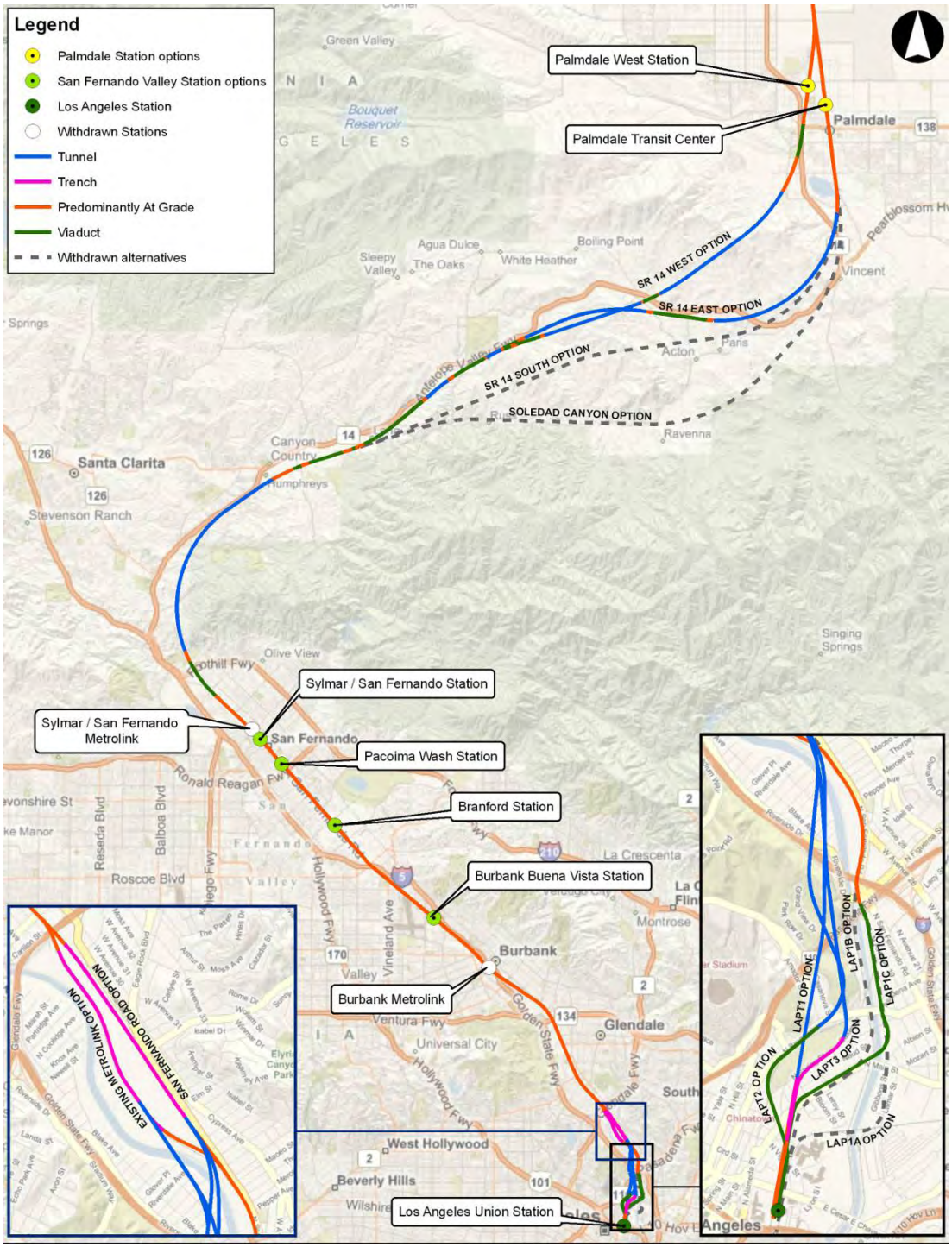
ALIGNMENT ALTERNATIVE/STATION LOCATION AND DESIGN OPTIONS	AA DECISION		REASONS FOR ELIMINATION (P–Primary S–Secondary)							ENVIRONMENTAL/OTHER CONCERNS
	Carried Forward	Withdrawn	Construction	Incompatibility	Right-of-Way	Connectivity/ Accessibility	Revenue/ Ridership	Community Impact	Environment	
LAP1B		X	S	P	S	S		S		Construction impacts to existing railroads; Impacts access to Metrolink CMF; Disruption to Gold Line Yard during construction and reduced access on completion; Residential/business/institutional displacements; Visual resources; Low speed curves leaving Union Station; Constructability of skewed, long-span Los Angeles River crossing under existing freeway bridges.
LAP1C	X									Residential/business/institutional displacements; Cultural and visual resources; Low speed curves leaving Union Station.
Metrolink CMF to SR 2										
Metrolink Alignment, At-grade		X		P		S			S	Not compatible with LAPT1, LAPT2 or LAPT3 alternatives; Reduced design speed. Connectivity between the Rio de Los Angeles State Park and the Los Angeles River; Impact to existing railroad; Visual impact; Business displacements.
Metrolink Alignment, in Trench	X									Reduced design speed; Connectivity between RDLASP and the Los Angeles River can be mitigated by bridging trench; Impact to existing railroad; Business displacements.
San Fernando Road Alignment, in Trench	X									Impact on Rio de Los Angeles State Park; Business displacements; Impact to Central Region High School No. 13.

ALIGNMENT ALTERNATIVE/STATION LOCATION AND DESIGN OPTIONS	AA DECISION		REASONS FOR ELIMINATION (P–Primary S–Secondary)							ENVIRONMENTAL/OTHER CONCERNS
	Carried Forward	Withdrawn	Construction	Incompatibility	Right-of-Way	Connectivity/ Accessibility	Revenue/ Ridership	Community Impact	Environment	
SR 2 to Sylmar										
Alignment ESS Metrolink/UPRR Profile Alternatives										
Profile A – at grade with HST elevated over selected grade crossings	X									Not viable close to existing overbridges; Impact to existing railroad; Visual resources; Noise and vibration; Construction cost, particularly if Metrolink/freight is also elevated at the same time.
Profile B1 – at grade with roads elevated over selected grade crossings	X									Residential/business displacements and access; Impact to existing railroad; Traffic impacts; Visual resources.
Profile B2 – at grade with roads depressed under selected grade crossings	X									Residential/business displacements and access; Impact to existing railroad; Traffic impacts; Existing utilities; Operating cost.
Profile C – at grade with HST depressed under selected grade crossings	X									Only used where other options are not viable (adjacent to airports); Not viable close to existing overbridges or underbridges; Impact to existing railroad; Existing utilities; Constructability; Construction and operating cost.

ALIGNMENT ALTERNATIVE/STATION LOCATION AND DESIGN OPTIONS	AA DECISION		REASONS FOR ELIMINATION (P–Primary S–Secondary)							ENVIRONMENTAL/OTHER CONCERNS
	Carried Forward	Withdrawn	Construction	Incompatibility	Right-of-Way	Connectivity/ Accessibility	Revenue/ Ridership	Community Impact	Environment	
Station Alternatives (for a Single HST Station in San Fernando Valley)										
Burbank Metrolink Station		X	S		P			P		Programmatic location, would need to leave the right-of-way for a length of several miles to satisfy design criteria; Freeway connectivity; Residential/business displacements; Noise and vibration; Constructability; Construction cost.
Burbank Buena Vista Alternative BVS	X									Business displacements; Traffic impacts and freeway connectivity; Noise and vibration; Hazardous materials.
Branford Alternative BSS	X									Adjacent water recharge ponds; Business displacements; Biological resources; Hazardous materials.
Pacoima Wash Alternative PWS	X									Elevated (60 feet above ground) station with long span bridge over freeway; Business displacements; Visual resources; Noise and vibration; Construction cost.
Sylmar/San Fernando Alternative SFS	X									Station outside Metrolink right-of-way to comply with design criteria; Constrained TOD potential; Business displacements. Cultural resources; Noise and vibration.
Sylmar/San Fernando Metrolink Station		X		P						Programmatic location, not compatible with need to cross active faults at grade - withdrawn

ALIGNMENT ALTERNATIVE/STATION LOCATION AND DESIGN OPTIONS	AA DECISION		REASONS FOR ELIMINATION (P–Primary S–Secondary)							ENVIRONMENTAL/OTHER CONCERNS
	Carried Forward	Withdrawn	Construction	Incompatibility	Right-of-Way	Connectivity/ Accessibility	Revenue/ Ridership	Community Impact	Environment	
Sylmar to Palmdale										
Alignment Alternatives										
Soledad Canyon		X	S		S	S			P	Longest route length and journey time; Impacts Angeles National Forest; Crosses Cemex mineral rights granted by Bureau of Land Management; Impacts to Lake Palmdale dam/ Lake Una and adjacent road and railroad; Disruption to existing railroads; Residential/business displacements; Biological resources.
SR 14 East	X									Impacts to Lake Palmdale dam/ Lake Una and adjacent road and railroad; Residential/business displacements;
SR 14 South		X	S			S		P	S	Impacts Angeles National Forest; Siphon on California Aqueduct; Crosses Cemex mineral rights granted by Bureau of Land Management; Impacts to Lake Palmdale dam/ Lake Una and adjacent road and railroad; Residential/business displacements; Visual resources; High capital cost; Community concerns
SR 14 West	X									Siphon on California Aqueduct; Residential/business displacements;
Station Options (for a Single Station in Palmdale)										
Option 1, East, Partially Within Right-of-Way	X									Compatible with SR 14 East alignment.
Option 2, West	X									Compatible with SR 14 West alignment

Figure ES-1 Alignment and Station Alternatives



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1. INTRODUCTION

The California High-Speed Rail Authority (the Authority) is studying alternative alignments for a high-speed train system within California. This study incorporates conceptual engineering information and identifies feasible and practical alternatives to carry out the environmental review and the evaluation for the Environmental Impact Report/Environmental Impact Statement (EIR/EIS) under the National Environmental Protection Act (NEPA) and the California Environmental Quality Act (CEQA). The Federal Railroad Administration (FRA) is the lead federal agency for NEPA and the Authority is the lead state agency for CEQA. The focus of this report is the Palmdale to Los Angeles section of the California High-Speed Train (HST) system.

1.1 California HST Project Background

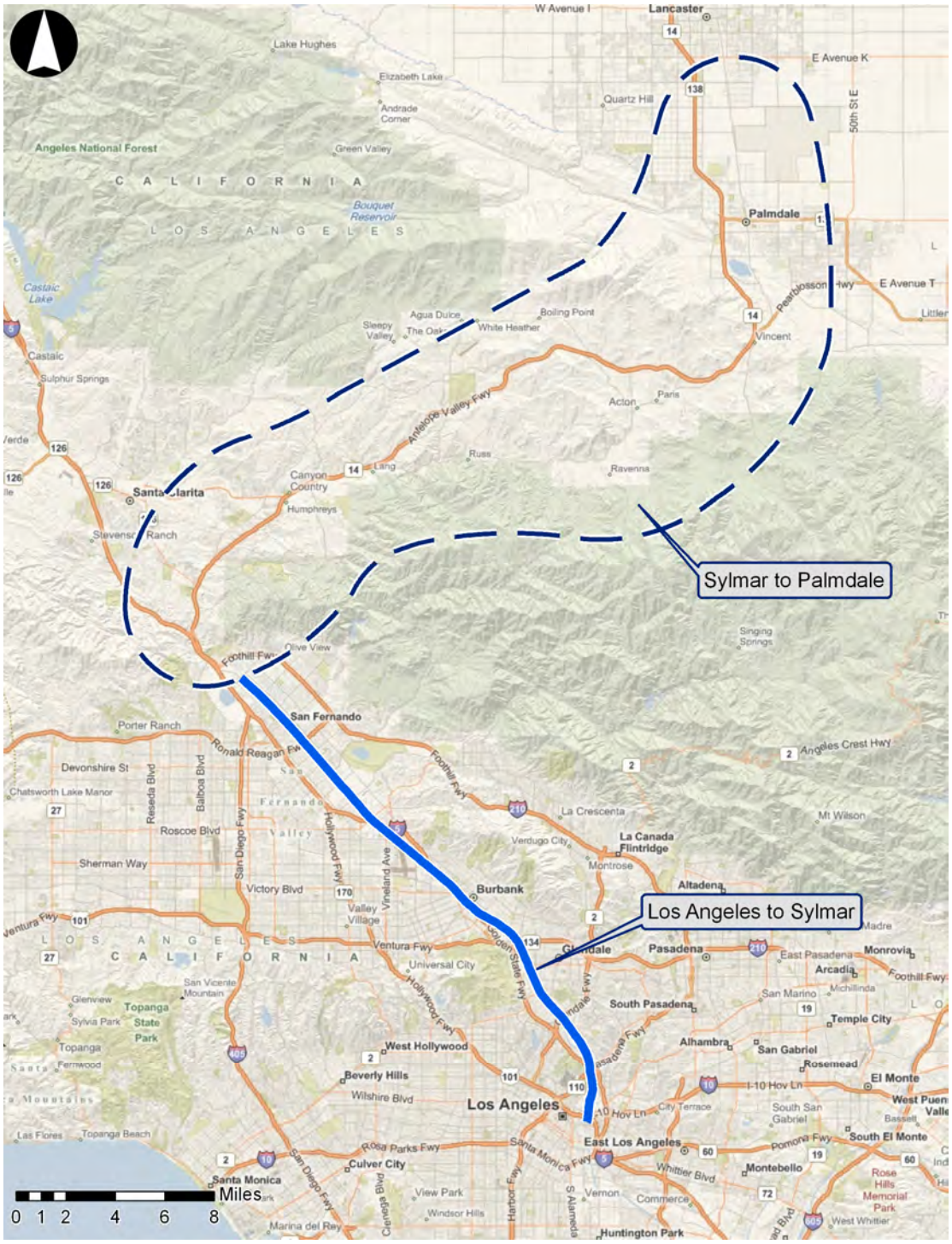
The California HST is planned to provide an interregional, high-speed train service over 800 miles of track throughout California, which will connect the major population centers of Sacramento, the San Francisco Bay Area, the Central Valley, Los Angeles, the Inland Empire, Orange County, and San Diego. The HST system is envisioned as a state-of-the-art, electrically powered, high-speed, steel-wheel-on-steel-rail technology, which will include state-of-the-art safety, signaling, and automated train-control systems. The trains will be capable of operating at speeds up to 220 mph over a fully grade-separated, dedicated track alignment, with an expected express trip time between San Francisco and Los Angeles of approximately 2 hours and 40 minutes.

The California HST system will be planned, designed, constructed and operated under the direction of the California High-Speed Rail Authority (Authority), a state-governed board that was formed in 1996. The Authority's statutory mandate is to develop a high-speed rail system that is coordinated with the state's existing transportation network, which includes intercity rail and bus lines, regional commuter rail lines, urban rail and bus transit lines, highways and airports.

1.2 Palmdale to Los Angeles HST Project Background

The Palmdale to Los Angeles High-Speed Train (HST) project section is approximately 60 miles long, and extends through a wide variety of land uses including rural, urban, densely populated cities and mountainous terrain. The corridor for the Palmdale to Los Angeles HST Project starts at Los Angeles Union Station, runs along the existing Metrolink Antelope Valley Line rail corridor northward through the San Fernando Valley, and then travels northeast on its own new route through the mountains from Santa Clarita to Palmdale where it rejoins the existing rail corridor. Within the corridor between Los Angeles Union Station and Sylmar, the Los Angeles County Metropolitan Transportation Authority (Metro) owns the rail right-of-way, the Southern California Regional Rail Authority (SCRRA) owns the track and operates the Metrolink commuter rail service, Amtrak provides intercity passenger service, and the Union Pacific Railroad (UPRR) holds track access rights and operates freight trains.

Figure 1.2-1 HST Corridor between LAUS and Palmdale



1.3 Study Area

The Palmdale to Los Angeles project section comprises two distinct geographic areas (see Figure 1.2-1) as described below:

- Los Angeles to Sylmar in the Los Angeles Basin and San Fernando Valley - from a new HST station to be located at the existing Union Station railroad terminal in downtown Los Angeles, to Sylmar, traversing dense urban and suburban development and infrastructure, generally following the existing Metrolink/freight railroad corridor (approximately 23 miles).
- Sylmar to Palmdale – through the San Gabriel Mountains, following a broader set of alignment options, generally between the State Route 14 (SR 14) corridor and Soledad Canyon (approximately 36 miles).

The study area for this Preliminary Alternatives Analysis Report is based on the preferred corridor selected by the Authority and the FRA in the Statewide Program EIR/EIS (see section 3.3).

1.4 Purpose of Study

This Alternatives Analysis Report describes preliminary planning, environmental, and engineering information used to identify feasible and practicable alternatives to carry forward for environmental review and preliminary engineering design in the Palmdale to Los Angeles HST Project EIR/EIS. This report has been prepared by the Authority and the FRA to document the preliminary evaluation of alternatives, indicating how each of the alternatives meets the purpose for the HST project, how evaluation measures were applied and used to determine which alternatives to carry forward for detailed environmental analysis, and which alternatives not to carry forward for further analysis.

The analysis begins with the alignment corridor selected at the conclusion of the 2005 Final Statewide Program EIR/EIS process. Public and agency comments received in response to the Project EIR/EIS scoping processes and during ongoing interagency coordination meetings were considered in preparing this report and in identifying initial alternatives to carry forward for this Alternatives Analysis. Alignment plans, profiles, and cross-sections were developed for the identified alternatives and used for this preliminary evaluation.

Section 2 describes the evaluation measures used for the Alternatives Analysis process. The development of the project alternatives are described in Section 3. Section 4 evaluates the alternatives and Section 5 summarizes the results of the Alternatives Analysis.

2. ALTERNATIVES DEVELOPMENT PROCESS

This study involves the creation and refinement of alternatives, through a series of processes that are intended to compare alternatives. This study follows a defined Alternatives Analysis process as described in the Authority issued Technical Memo 'Alternatives Analysis for Project-Level EIR/EIS (December 2008)', and uses both qualitative and quantitative measures that reflect a mixture of applicable policy and technical considerations.

The techniques used to gather information, and develop and compare alternatives include:

Field Inspections of Corridors - The potential alignment, right-of-way, and station location are the subject of field inspection by experienced planning personnel, engineers, and analysts knowledgeable in high speed railroad operations, for the purpose of identifying conditions and factors not visible in aerial photos or on maps. Over the course of the study, field inspections become progressively more detailed as the alternatives are refined by the planning and engineering work.

Project Team Input and Review - The project team conducts team meetings to discuss alternatives and local issues that potentially impact alignments.

Qualitative Assessment - A number of the qualitative measures used to describe the alternative alignments are developed by professionals with experience in the construction and operation of high-speed rail and other transportation systems. These measures include constructability, accessibility, operability, maintainability, right-of-way, public infrastructure impacts, railway infrastructure impacts, and environmental impacts.

Engineering Assessment - Engineering assessments are provided for a number of measures that can be readily quantified at this stage of project development. The engineering assessments can provide information on project length, travel time, and configuration of key features of the alignment such as the presence of existing infrastructure.

GIS Analysis - The bulk of the assessment is performed using GIS data, which enables depictions of the project's interactions with a variety of measurable geographic features, both natural and built. GIS data is used to assess impacts on farmland, water resources, floodplains, wetlands, threatened and endangered species, cultural resources, current urban development, infrastructure, and oil and gas exploration and production.

Stakeholder, Agency, and Public Input - Comments and suggestions received in the course of the Alternatives Analysis phase project outreach are factored into alternative development and considered in the assessment process.

Assessment and analysis measures have been developed for each step in the process outlined above. The evaluation measures, as applied, become progressively more technical and quantitative as alternatives evolve.

2.1 HST Project Purpose and Objectives

The purpose of California High Speed Train (HST) Project is to implement the statewide HST System in sections along the corridors selected in program-level (Tier 1) decisions, that will: (1) link Southern California cities, the Central Valley, Sacramento, and Bay Area; (2) provide a new transportation option

that increases mobility throughout California; (3) provide reliable HST service that delivers predictable and consistent travel times using electric powered steel wheel trains, and (4) provide a transportation system that is commercially viable.

Specific project objectives of the HST system within the Palmdale to Los Angeles section include:

- Improve mobility by relieving the mounting congestion and capacity constraints in the region's saturated interstate freeways and State Routes by providing the alternative of a high speed train transportation mode.
- Improve mobility by providing the HST service as an alternative to air travel in the highly congested corridor between Los Angeles and San Francisco.
- Maximize connectivity and accessibility for passenger rail and transit at Los Angeles Union, Palmdale and intermediate station(s).
- Provide a reliable reduction in travel time between Los Angeles and Palmdale.
- Provide an HST alignment that is feasible in terms of engineering challenges, construction, and right-of-way constraints.
- Minimize disruption to neighborhoods and communities along the corridor by limiting right-of-way acquisitions, project design impacts, and the potential for affecting community resources.
- Preserve environmental quality and protect sensitive environmental resources by reducing emissions and vehicle miles traveled for intercity trips within the Los Angeles County area, and by maximizing avoidance and minimizing impacts on sensitive environmental and natural resources along the project corridor.
- Maximize the ridership/revenue potential by providing dependable HST operation in the Palmdale to Los Angeles section of the statewide HST system.
- Minimize capital and operating costs related to construction, operations, and maintenance of the Palmdale to Los Angeles section of the state-wide HST system.

2.2 Identification of Alternatives to be Carried Forward

The aim of this report is to document the alternatives development and evaluation process and to identify the alternatives to be carried forward through the environmental review process and engineering design. Considerations that would qualify an alternative to be carried forward include:

- Alternative meets purpose and need and project objectives in providing a sustainable reduction in travel time between major urban centers.
- Alternative has no environmental or engineering issues that would make approvals infeasible.
- Alternative is feasible and practical to construct.
- Alternative avoids or reduces adverse environmental impacts.

2.3 HST Design Objectives

To determine each alternative's ability to satisfy the HST project's primary design intent, each project alternative is evaluated using system service criteria that address the alignment and the station locations in terms of performance. The key objectives and criteria are summarized in Table 2.3-1.

Table 2.3-1 Alignment and Station Performance Objectives and Measures

Objective	Measure
Maximize Ridership/ Revenue potential	Travel Time
	Route Length
Maximize connectivity and accessibility	Intermodal connections
Minimize operating and capital costs	Operating and maintenance costs
	Capital cost

2.4 Comparison of Project Alternatives

In addition to the HST design objectives and criteria in Table 2.3-1, additional measures are used to evaluate and compare the project alternatives. Each of these five additional measures is discussed in more detail below.

A. Land use supports transit use and is consistent with existing and adopted local, regional, and state plans and is supported by existing or future growth areas.

Table 2.4-1 Land Use Evaluation Measures

Land Use		
Measurement	**Method**	**Source**
Development potential for Transit Oriented Development (TOD) within walking distance of station	Identify existing and proposed land uses within 1/2-mile of station locations; identify if there are TOD districts, TOD overlay zones, mixed use designations, or if local jurisdictions have identified station areas for redevelopment or economic development	Regional and local planning documents and land-use analysis and input from local planning agencies
Consistency with other planning efforts and adopted plans	Qualitative - general analysis of applicable planning and policy documents	Land-Use Analysis; Baseline Conditions Study

B. Construction of the alternative is feasible in terms of constructability and right-of-way (ROW) constraints.

Table 2.4-2 Constructability Evaluation Measures

Constructability and Right-of-Way		
Measurement	**Method**	**Source**
Constructability, access for construction, within existing transportation Right-Of-Way	Extent of feasible access to alignment for construction	Conceptual plans and maps
Disruption to existing railroads	Right-of-way constraints and impacts on existing railroads	Conceptual plans and maps
Disruption to and relocation of utilities	Number of utilities crossed	Conceptual plans and maps

C. Minimizes disruption to neighborhoods and communities – the extent to which an alternative minimizes right-of-way acquisitions, minimizes dividing an established community, and minimizes conflicts with community resources.

Table 2.4-3 Community Evaluation Measures

Minimized Disruption to Neighborhoods and Communities		
Measurement	**Method**	**Source**
Displacements	If possible, identify number of properties by land use type that would be displaced, or acres of land within the right-of-way/station footprint, by type of land use: single family, multifamily, retail/commercial, industrial, etc.	Identified comparing the alignment conceptual design drawings with aerial photographs, zoning maps, and General Plan maps
Property with Access Affected	Identify potential locations along the alignments or at station locations where access would be affected	Estimated off conceptual design plans and aerial photographs
Local Traffic Effects around Stations	Identify potential locations where increases in traffic congestion or decreases in levels of service are expected to occur	Existing traffic levels of service from local jurisdictions
Local Traffic Effects along Route	Identify potential locations of at-grade-separations where increases in traffic congestion or decreases in levels of service are expected to occur	Existing traffic levels of service from local jurisdictions

D. Minimizes impacts on environmental resources – the extent to which an alternative minimizes impacts on natural resources.

Table 2.4-4 Environmental Resources Evaluation Measures

Minimized Impact on Environmental Resources		
Measurement	**Method**	**Source**
Waterways, wetlands, and natural preserves, or biologically sensitive habitat areas affected	Identify new bridge crossings required; rough estimate of acres of wetlands; linear feet of crossings of waterways; acres and species of potential threatened and endangered habitat affected; acres of natural areas/critical habitat affected	Measured from conceptual design plans and GIS layers
Cultural Resources	Identify locations of National Register of Historic Places- or California Historical Resources Information System-listed properties; for archaeological resources, identify areas of high or moderate sensitivity based on previous studies conducted in the study area	Based on conceptual design plans and GIS layers;, Section 4(f) studies and cultural resource records search and surveys
Parklands	Number and acres of parks that could be directly and indirectly affected; this would also include major trails that would be crossed	Based on conceptual design plans and GIS layers; Section 4(f) studies
Agricultural Lands	Acres of prime farmland, farmland of statewide importance, unique farmland, and farmland of local importance within preliminary limits of disturbance.	Based on concept plans and GIS layers

E. Enhances environmental quality – the extent to which an alternative minimizes impacts on the natural environment.

Table 2.4-5 Natural Environment Evaluation Measures

Minimize Impact on Natural Environment		
Measurement	**Method**	**Source**
Noise and Vibration effects on sensitive receptors	Identify types of land use activities that would be affected by HST pass-by noise and ground vibration	Results of FRA screening level assessment; Inventory of potential receptors from site survey and aerial maps
Change in visual/scenic resources	Identify number of local and scenic corridors crossed and scenic/visual resources that would be affected by HST elevated structures in scenic areas and shadows on sensitive resources (parks); identify locations where residential development is in close proximity to elevated HST structures	Result of general assessment; Survey of alignment corridors and planning documents
Maximize avoidance of areas with geological and soils constraints	Identify number of crossings of known seismic faults, acres of encroachment into areas with highly erodible soils, acres of encroachment into areas with high landslide susceptibility	USGS maps and available GIS data
Maximize avoidance of areas with potential hazardous materials	Hazardous materials/waste constraints	Data from state and federal records search of potential hazardous materials locations and generators

3. PROJECT ALTERNATIVES

The evaluation of alternatives is based on the key differentiators between alternatives. This section describes the No Project Alternative, the initial range of alternatives reviewed, and the alternatives carried forward for more detailed evaluation in the Alternatives Analysis.

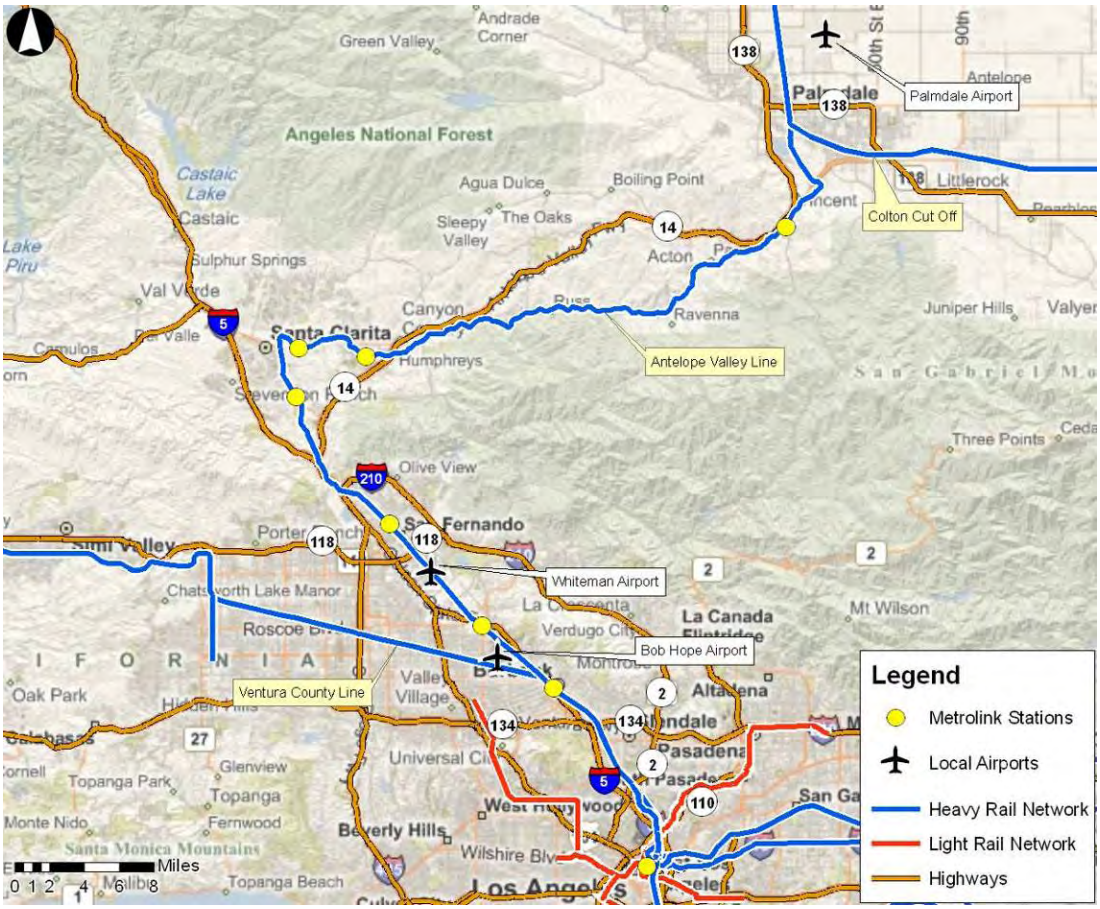
3.1 No Project Alternative

The No Project Alternative represents the existing conditions of the Palmdale to Los Angeles HST section as it exists today and as it would exist in the future without the HST project. This is based on future development projects and improvements to the intercity transportation system that are programmed and funded for construction. The current and future projects are as listed by Caltrans, Metro, the City of Los Angeles Department of Transportation (LADOT), and the Southern California Association of Governments (SCAG) 2008 Final Regional Transportation Plan (RTP).

3.1.1 Existing Transportation Infrastructure

Key existing transportation infrastructure is shown below in Figure 3.1-1.

Figure 3.1-1 Existing Transportation Infrastructure



Rail

The surface platform tracks at Union Station serve Amtrak inter-city and Metrolink commuter rail services. Separate surface platforms serve the Metro Gold Line light rail transit system. The Eastside Extension of the Metro Gold Line from Union Station added six miles and eight new stations to the system, and opened in late 2009. The underground tracks at Union Station serve the Metro Red and Purple transit lines.

Going north from Los Angeles Union Station the eleven platform tracks merge into four tracks, then diverge into pairs of tracks on the east and west banks of the Los Angeles River. The west bank tracks cross over to the east bank before the I-5 freeway. North of the I-5 there are three through tracks past the Metrolink Central Maintenance Facility.

The Antelope Valley Line runs between Los Angeles Union Station and Palmdale. It was constructed in 1876 by the Southern Pacific Railroad. The line is currently a two-track line south of Burbank Junction at which point the Ventura County Line branches westwards. It continues as a two track line to the grade crossing of North Buena Vista Street before becoming single track and continuing northward. The existing right-of-way is approximately 100 feet wide over most of its length, with the existing tracks running

generally down the center of the right-of-way. A typical view of the single track section is shown in Figure 3.1-2. The right-of-way also contains utility easements, including an oil pipeline and communications typically on the west side, and a gas pipeline on the east side that is not in use.

Metro owns the right-of-way and SCRRA operates the Metrolink commuter rail service on the Antelope Valley Line. Freight services, operated by the Union Pacific Railroad, also utilize the line. Amtrak operates long-distance passenger services to San Francisco on the line between Los Angeles Union Station and Burbank Junction.

The Antelope Valley Line speed varies with the track geometry, between 15 mph and 79 mph for passenger trains (60 mph for freight trains). The journey from Union Station to Palmdale on Metrolink takes between 1.5 and 2 hours.

For the majority of the study area, the Antelope Valley line runs adjacent to San Fernando Road. Twenty one streets cross the railroad at-grade between Chevy Chase Drive and Bledsoe Street. The crossings range in size from smaller streets such as Arvilla Avenue, to major arterials such as Van Nuys and Sunland Boulevards.

Two industrial properties within this subsection are served by the Antelope Valley Line: a plywood factory located immediately to the north of SR 118 and a quarry north of Tuxford Street. The properties are on the east side of the rail corridor and both are served by spurs. There are also several properties along the corridor that appear to have been served by rail in the past. While sections of track remain at these properties, they are no longer connected to the main line.

There is a landscaped bicycle and pedestrian path alongside the railroad between the Pacoima Wash and Bledsoe Street.

Figure 3.1-2 Typical View of the Antelope Valley Line in the Study Area

North of Sylmar the Antelope Valley Line travels through Soledad Canyon just north of the Angeles National Forest (ANF). Existing Metrolink stations are located in Sylmar, Santa Clarita, Acton and Palmdale. Union Pacific Railroad runs freight trains on the same tracks between Sylmar and Palmdale. Through the Palmdale area, Union Pacific and Metrolink travel parallel to Sierra Highway. The right-of-way here is generally 200 feet wide in total, mostly owned by UPRR who operate freight services on a single track. Within this overall width is a 40-foot strip of right-of-way owned by Metro, on which Metrolink operates commuter services on a separate single track.

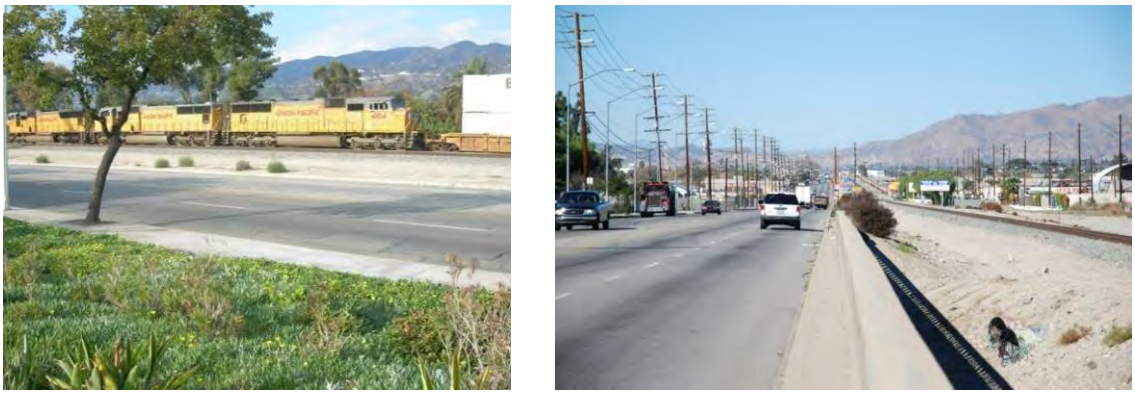
A separate Union Pacific freight line, the Colton cut-off, enters Palmdale from the east in the southern portion of the city and runs on a track parallel to Metrolink north through Palmdale.

Highways/ Roadways

San Fernando Road runs adjacent to the Antelope Valley line through the majority of the San Fernando Valley. It is a key north-west to south-east road in the eastern portion of the San Fernando Valley. See Figure 3.1-3.

Several freeways are located close to the study area. Interstate 5 (I-5) runs on a north-west/south-east axis through the study area. It crosses the Antelope Valley line three times and runs alongside it for approximately 2 ½ miles in the Burbank area. The east-west freeways, SR 110, SR 2, SR 134 and SR 118 pass over the rail corridor.

Figure 3.1-3 Typical Views of San Fernando Road



SR 14 runs on a north-east/south-west axis through the study area between Sylmar and Palmdale, generally paralleling the Metrolink rail line. In the north Sylmar area, north-south freeway I-210 converges to intersect I-5 and SR 14. Soledad Canyon Road is a regional connector between Santa Clarita and Acton. Sierra Highway is a regional connector between Acton and the cities north of Palmdale. In Palmdale, the east-west SR 138 crosses the Antelope Valley line in the southern part of the city.

Airports

There are three airports located close to the Antelope Valley line, Bob Hope Airport, Whiteman Airport and Palmdale Airport. These are close enough to the existing rail right-of-way to constrain the alignment vertically.

Bob Hope Airport, also known as Burbank-Glendale-Pasadena Airport, is situated to the west of the rail line in Burbank. This airport actively serves several major commercial airlines with multiple daily passenger flights and has two runways, one of which abuts the rail corridor.

Whiteman Airport abuts the east side of the Antelope Valley line in Pacoima. It is a smaller general aviation airport with a single runway that parallels the tracks between Osborne and Pierce Streets serving primarily private users and emergency and law enforcement agents.

Palmdale Airport is approximately 3 miles east of SR 14 and 1 mile north of Avenue P. It is a general aviation, commercial and military airport with a single runway.

Aerial views of Bob Hope, Whiteman and Palmdale Airports adjacent to the tracks are shown in Figure 3.1-4 to Figure 3.1-6. In these figures the Antelope Valley rail line is highlighted by a red line.

Figure 3.1-4 Bob Hope Airport

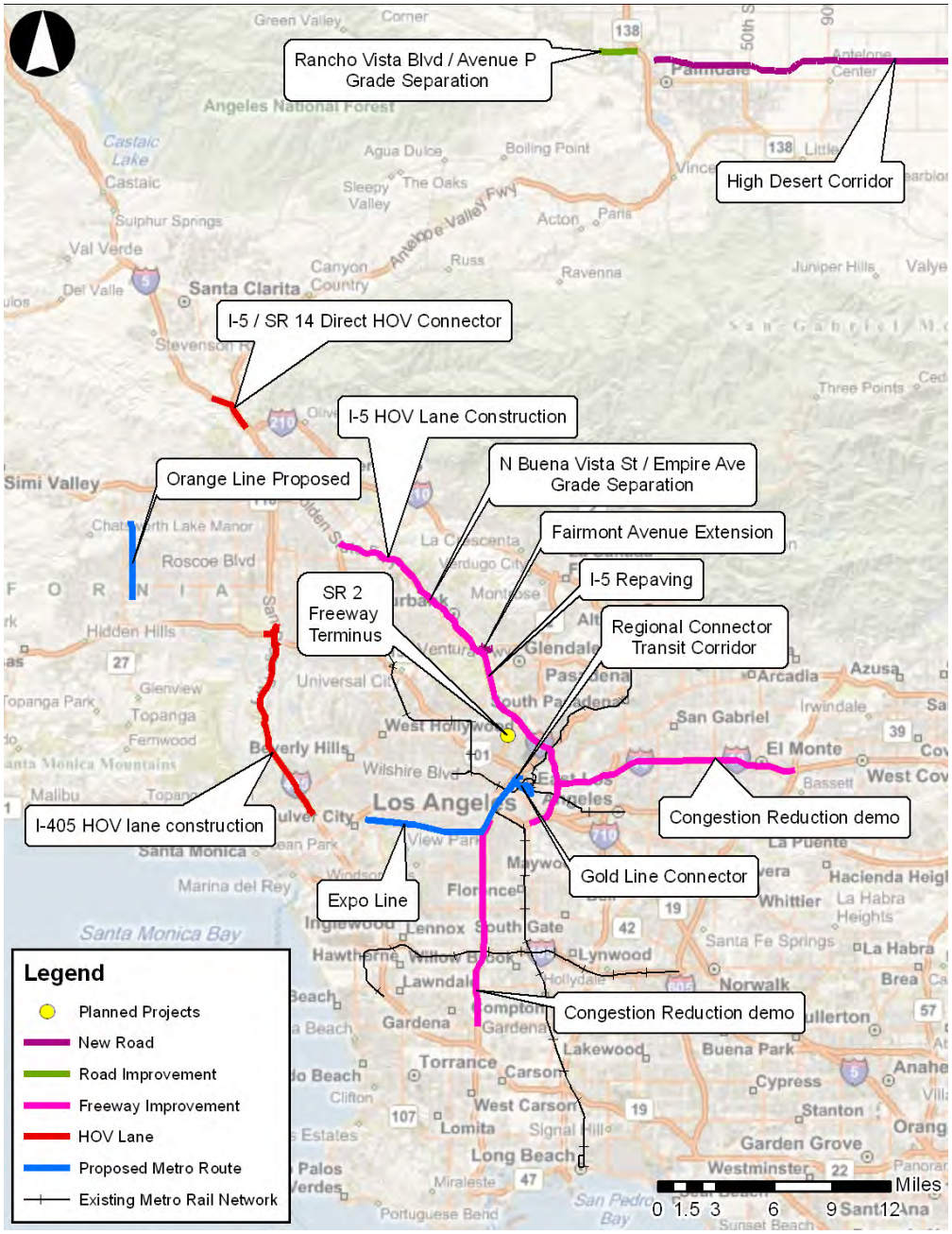
Figure 3.1-5 Whiteman Airport

Figure 3.1-6 Palmdale Airport

3.1.2 Future Projects

Major current and future programmed and funded transportation projects are illustrated in the figure below.

Figure 3.1-7 Current and Future Projects Along the Palmdale to Los Angeles HST Section



Exposition Light Rail Transit Line (Expo Line)

The Expo Line will travel approximately 8.6 miles along the Exposition railroad right-of-way between downtown Los Angeles and Culver City. Travel time from downtown Los Angeles to Culver City is estimated as less than 30 minutes, with a projected ridership of 27,000 by 2020. The Expo Line begins at the existing 7th/Metro Center station, and terminates at the Washington/National Station. The alignment, which includes eight new stations and two existing stations, will be landscaped and enhanced with bike and pedestrian paths. The Expo Line is scheduled to open in 2010.

Regional Connector Transit Corridor Project

The Metro is conducting an environmental review of the Regional Connector Transit Corridor, which would create an approximately two-mile transit link between the Gold Line and Blue Line light rail transit (LRT) systems through downtown Los Angeles. The Regional Connector LRT extension would provide a continuous trip between the Pasadena Gold Line and Blue Line and between the Eastside Gold Line and Expo Gold Line, as well as serving several new downtown stations and allowing through-service between the regional LRT lines. The Regional Connector is expected to improve access to both local and regional destinations, and will enable all Los Angeles County rail and bus transit, as well as all intercity transit service to operate more efficiently.

Congestion Reduction Demonstration Project

On December 31, 2010 Metro in conjunction with Caltrans and other local transportation agencies will begin a one year demonstration project of converting High-Occupancy Vehicle (HOV) lanes to High-Occupancy Toll (HOT) lanes, also known as Express Lanes. The I-10 El Monte Busway between Alameda Street and the I-605, and the I-110 Harbor Transitway between Adams Boulevard and the Artesia Transit Center will be tolled. General purpose lanes on the I-10 and I-110 will not be tolled. Roadway improvements for this project include the re-striping of the I-10 El Monte Busway between the I-605 and the I-710 to create a second HOT lane; the widening of Adams Boulevard and the restriping of the I-110 Adams Boulevard off-ramp to create a second right-hand turning lane; and the construction of new HOT access transition lanes between the I-110 HOT lanes and the I-110 general purpose lanes to smooth the flow of traffic in and out of the HOT lanes. This project will include expansions and improvements to transit centers, and will also increase transit service and vanpools on the I-10 and I-110 Express Lanes.

Golden State Freeway (I-5) Repaving Project

The I-5 Repaving Project will replace damaged concrete on I-5 within the cities of Los Angeles, Glendale, and Burbank, to improve ride quality and reduce maintenance costs. Work will also include guardrail replacement. The segment of the I-5 between SR 110 and Burbank is within the study area. Construction of the project began in 2005 and is expected to be completed in winter 2010.

I-5 HOV Lane Construction

Caltrans will construct a High Occupancy Vehicle (HOV) lane in each direction of I-5 between the City of Los Angeles and the City of Burbank, to improve traffic flow and reduce congestion. Work will also include modifications to on- and off-ramps at the Burbank Boulevard interchange and realignment of a segment of the I-5. The project is located within the study area, adjacent to the SR 2 to Sylmar alignment.

Construction of the HOV lanes and the modifications to the Burbank Boulevard interchange require the acquisition of a strip of the rail right-of-way in the Empire Avenue and North Buena Vista Street area. This development is linked to improvements to Metrolink, (see below).

SR 2 Freeway Terminus Improvement

Metro, in cooperation with LADOT and Caltrans, is in the process of completing a Draft Initial Study/Environmental Assessment (IS/EA) for SR 2 Freeway Terminus Improvement project. The SR 2 terminus is located within the Palmdale to Los Angeles study area near Glendale Boulevard and Duane Street. The project aims to improve traffic flow and reduce congestion at the SR 2 terminus, to provide pedestrian enhancement at the terminus, and to ensure compatibility with existing residential and commercial uses. Six potential alternatives were selected and each alternative considered is analyzed in the draft ES/EA. Alternatives include widening existing ramps, realigning ramps with variations to full or partial retention of the bridge and flyover, and realigning ramps and removing a bridge and flyover.

I-405 Sepulveda Pass Project

The Sepulveda Pass Project will extend HOV lanes on northbound I-405 between I-10 and the US Highway 101. These improvements are aimed at reducing congestion, increasing mobility, decreasing commute times, enhancing safety, reducing air pollution, and promoting ridesharing. The Environmental Document has been approved and enabling works have begun; the main construction work is programmed to start in 2010.

Fairmont Avenue Extension

The City of Glendale's Public Works Department is building the Fairmont Avenue Extension Project. The project consists of an extension of Fairmont Avenue westwards over San Fernando Road, the Antelope Valley Line, and the Verdugo Wash. The purpose is to improve access to the Grand Central industrial area. The project incorporates a passive provision for the future construction of a link under SR 134 to Doran Street. The project is planned to be completed in August 2010.

North Buena Vista Street and Empire Avenue Grade Separation

As part of the I-5 HOV Lane construction, (described previously), Metrolink is developing an improvement to remove the North Buena Vista Street at-grade crossing by elevating the rail line over the street. Additionally, this grade separation would allow Empire Avenue to be extended underneath the rail corridor. This project includes an extension northwards of the twin track section of the Antelope Valley Line from the Burbank Junction to North Hollywood Way.

80% designs have been completed for the project, and it is being progressed as part of the broader I-5 HOV Lane project with anticipated construction start in 2011.

I-5/SR 14 Direct HOV Connector

The I-5/SR 14 Direct High Occupancy Vehicle (HOV) Connector Project will construct an elevated two-lane direct HOV lane connector to connect the HOV lanes of the Golden State Freeway (I-5) and the Antelope Valley Freeway (SR 14). North and southbound HOV lanes will also be constructed on the I-5 at the interchange. The direct HOV connector will allow motorists to transfer from one freeway to another without exiting the carpool lane. The construction of the HOV direct connector and the HOV lanes on the I-5 will help to relieve congestion, improve traffic flow, and enhance safety at the I-5/SR 14 freeway

interchange. Project construction is currently 10% complete and is expected to be fully complete by the fall of 2012.

Rancho Vista Boulevard/Avenue P Grade Separation

Rancho Vista Boulevard/Avenue P provides the main access to the Palmdale Regional Airport and U.S. Air Force Plant 42 in the City of Palmdale. The Rancho Vista Boulevard/Avenue P Grade Separation project will require right-of-way along Rancho Vista Boulevard/Avenue P. The project, which includes roadway widening, will improve safety and increase capacity along Rancho Vista Boulevard between SR 14 and 20th Street East.

Caltrans is currently designing these interchange and roadway improvements. Construction and completion dates have not been confirmed.

High Desert State Route (SR 138) Corridor Improvements

The State Route 138 (SR 138) Improvements Corridor project consists of widening the SR 138 corridor from Avenue T in the City of Palmdale to the junction of SR 18 in the City of Llano. SR 138 carries heavy vehicular traffic and is considered an inter-regional corridor linking Los Angeles County within the vicinity of the Cities of Palmdale and Lancaster to San Bernardino County within the vicinity of the Cities of Victorville, Apple Valley, and Adelanto. SR 138 improvements have been divided into several segments consisting of separated phases of the widening project. The SR 138 corridor will be widened to four lanes, two in each direction, and includes drainage improvements. The project will increase mobility, relieve congestion, improve the movement of goods and services along SR 138, and enhance safety along the corridor.

Caltrans is currently designing these roadway improvements. Construction and completion dates have not been confirmed.

3.1.3 Related Studies

SCRRA Strategic Assessment Review

In January 2007, the SCRRA (Metrolink) produced a Strategic Assessment which details then-current ridership and service levels, assesses likely future demand, and proposes increases in train service to meet this anticipated demand. The primary subjects of the assessment include patronage forecasting and financial analysis. The Strategic Assessment outlines ways in which Metrolink ridership could be tripled by 2030 and recommends significant increases in train service frequency and capacity.

The SCRRA Strategic Assessment was reviewed for its potential impact on the HST project, and the key finding is that an allowance for two Metrolink tracks should be provided from the Los Angeles Union Station (LAUS) to Sylmar to allow Metrolink to add passing sidings as train service frequency increases.

Funding to implement the SCRRA proposals is currently very limited and generally only allows the completion of isolated projects such as grade separations of existing grade crossings.

3.2 Program Alternatives

3.2.1 Statewide Program EIR/EIS Alternatives

The Statewide Program EIR/EIS (Program EIR/EIS) for the CHSTP was completed in November, 2005. The Authority and FRA selected the technology for the HST system and identified potential route and station location options through the program environmental analysis. For a more detailed examination of these issues, refer to the California High-Speed Train Final Program EIR/EIS.

The Program EIR/EIS examined three major system alternatives for the state-wide transportation network:

- No Project Alternative – The State's transportation network as it is today, along with funded projects already included in regional transportation plans.
- Modal Alternative – Enhancements to the State's transportation network using existing modes and technologies (mainly expanded airports and highways).
- High-Speed Train Alternative – A new high-speed train system to connect California's major urban centers.

The High Speed Train Alternative was selected as the preferred system alternative based on the findings of the Program EIR/EIS. The No Project Alternative would not provide the needed level of future intercity mobility, while the Modal Alternative would provide smaller mobility gains than the HST Alternative. In addition, the Modal Alternative would cost more than the HST Alternative and result in more environmental impacts.

3.2.2 Routing and Station Options

The HST Program EIR/EIS examined potential corridor alignments between Sylmar and Los Angeles and between Bakersfield and Sylmar separately.

The Authority determined that sharing existing commuter and freight tracks would not meet the HST project's purpose and that dedicated tracks are necessary to achieve its performance goals in this section.

Sylmar to Los Angeles Union Station (LAUS)
The corridors considered were:

- I-5 Freeway - Generally followed I-5 from LAUS to Sylmar. Since HST horizontal curves have much larger radii than highway curves, the rail line did not consistently adhere to the highway alignment. It involved substantial right-of-way acquisition, tunneling, and considerable use of aerial structures to pass over existing overpasses and connector ramps.
- MTA/Metrolink – Followed the MTA/Metrolink Antelope Valley Line between the LAUS area and Sylmar. There was an elevated option over I-5 and I-10 between LAUS and Burbank.
- I-5/Metrolink – Extended north from the LAUS area, under Elysian Park, alongside the I-5, then northwest following the MTA/Metrolink alignment from Burbank Metrolink station to Sylmar.

The alignments are shown in Figure 3.2-1.

Figure 3.2-1 Los Angeles to Sylmar Program EIR/EIS Alternatives

The station options evaluated in the Program EIR/EIS for the LAUS to Sylmar section were:

- Los Angeles Union Station
- Downtown Burbank Station
- Sun Valley Station
- Sylmar Station

Based on the program EIR/EIS findings, the Authority and FRA selected the MTA/Metrolink as the preferred corridor for the LAUS to Sylmar section of the dedicated-track HST project, as further described in section 3.2.3. Between Burbank and LAUS this referred to a relatively broad corridor within which alignment variations could be studied at the project level. The MTA/Metrolink corridor was deemed to

have less environmental impact, fewer constructability issues, fewer impacts on local communities, and require less right-of-way than the Combined I-5/Metrolink alignment option.

Bakersfield to Sylmar

Two corridors were considered, with sub-options for the I-5 route near Bakersfield:

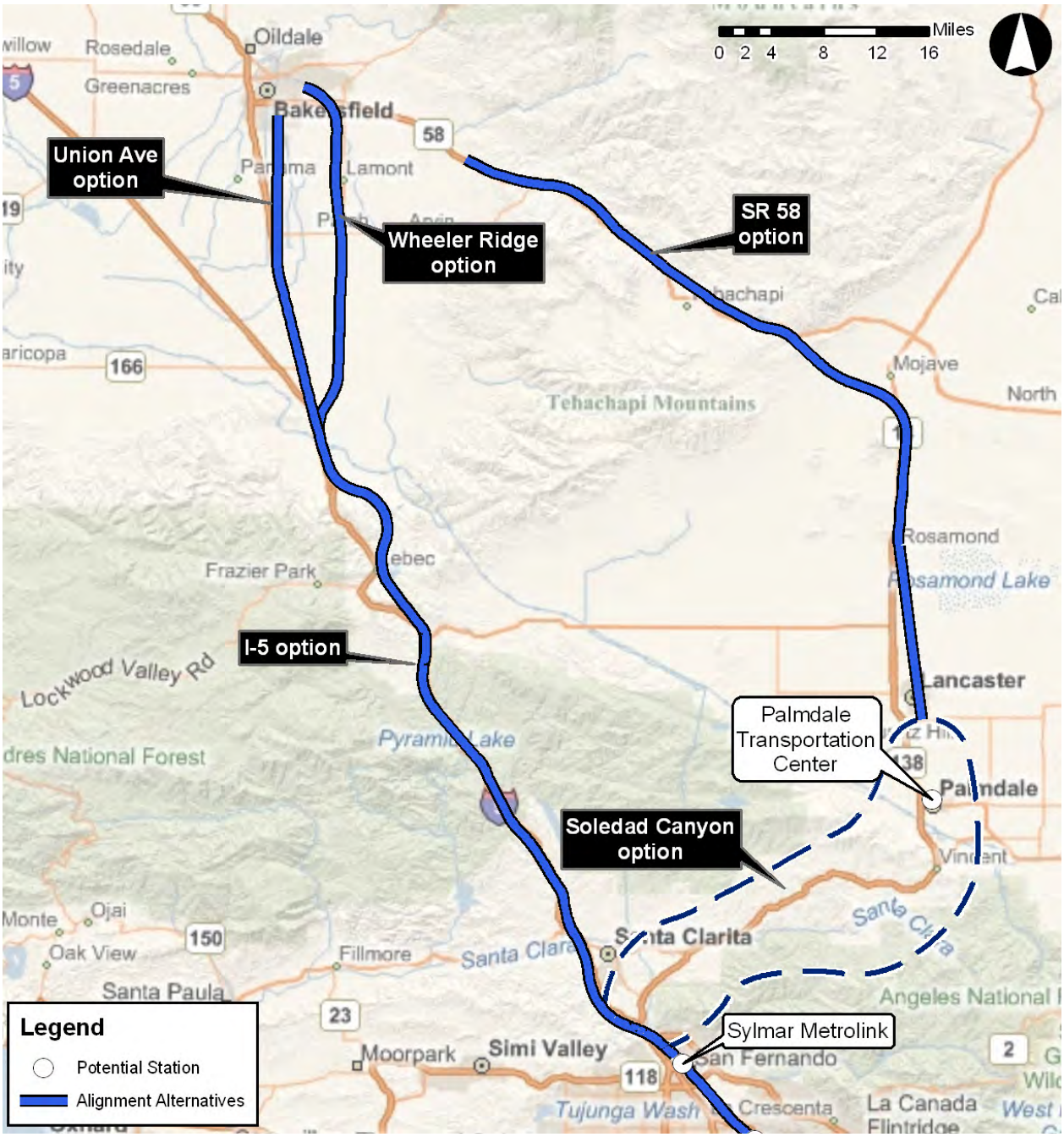
- I-5/Grapevine corridor – For the most part, this alignment followed the I-5 corridor from the junction at I-5/SR 99 to Sylmar. This corridor assumed the use of new HST tracks separate from all other rail traffic and included long sections of tunneling.
- SR 58/Soledad Canyon (Antelope Valley) corridor – This alignment extended east from Bakersfield along SR 58, generally following SR 58 through the Tehachapi Mountains to Mojave, along MTA/Metrolink through Antelope Valley and Soledad Canyon, and generally followed SR 14 from Santa Clarita to Sylmar. This corridor also assumed the use of new HST tracks separate from all other rail traffic and included long sections of tunneling.

The station options evaluated in the Program EIR/EIS for the Bakersfield to Sylmar section were:

- SR 126/I-5 interchange (I-5/Grapevine)
- Magic Mountain Parkway/I-5 (I-5/Grapevine)
- The Old Road (I-5/Grapevine)
- Palmdale Transit Center (SR 58/Soledad Canyon)

Figure 3.2-2 shows the I-5/Grapevine and the SR 58/Soledad Canyon (Antelope Valley) corridors, as well as potential station locations at Palmdale Transit Center and at Sylmar Metrolink Station.

Figure 3.2-2 Bakersfield to Sylmar Program EIR/EIS Alternatives



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Based on the Program EIR/EIS, the Authority and FRA selected the SR 58/Soledad Canyon (Antelope Valley) corridor as the preferred alignment for the Bakersfield to Sylmar section of the dedicated-track HST project. Although the longer Antelope Valley alignment would add about ten minutes to express service travel times between northern and southern California and would have less intercity ridership potential (trips between regions) than the I-5 alignment option, it was deemed to have fewer potential environmental impacts, be less subject to seismic activity, have considerably less tunneling and thereby fewer constructability issues, and would also increase connectivity and accessibility to the Antelope Valley. The Authority and FRA defined this alignment in the Program EIR/EIS as a relatively wide corridor between Santa Clarita and Palmdale that included both the SR 14 and Metrolink/UPRR alignment options between the Antelope Valley and Santa Clarita.

3.2.3 Selected Program Level Alignment Alternative and Station Locations

The corridor selected by the Authority and FRA at program level runs predominantly within the existing Metrolink/UPRR railroad right-of-way from Los Angeles Union Station (LAUS) to Sylmar, generally parallel to SR 14 from Sylmar to Santa Clarita, and either in proximity to Metrolink or along SR 14 between Santa Clarita and Palmdale.

The programmatic horizontal alignment provided design speeds of:

- Increasing to 140 mph between LAUS and SR 2;
- 140 mph between SR 2 and North San Fernando Boulevard;
- 220 mph between North San Fernando Boulevard and Sylmar;
- 220 mph between Sylmar and Palmdale.

The programmatic profile for the preferred alignment was generally:

- Elevated or at-grade between LAUS and Taylor Yard;
- Depressed or at-grade between Taylor Yard and SR 2;
- At-grade between SR 2 and Grandview Avenue;
- Elevated between Grandview Avenue and North Buena Vista Street;
- At-grade between North Buena Vista Street and Hollywood Way;
- Depressed between Hollywood Way and Pacoima Wash;
- Elevated between Pacoima Wash and Hubbard Avenue;
- As dictated by the rugged mountain terrain traversed between I-210 and Palmdale, subject to the design criteria maximum gradients.

It was recognized that opportunities exist to mitigate potential impacts by adjusting this profile at project level.

The preferred station locations for the HST within the Palmdale to Los Angeles section were identified as:

- Los Angeles Union Station
- Burbank

- Sylmar
- Palmdale

During the project-level environmental review of the Palmdale to Los Angeles section, the Authority will continue to work closely with the potentially affected communities to avoid, reduce, and/or minimize impacts and to include feasible measures to mitigate potential impacts to local communities.

The Authority will continue to work with local, state, and federal agencies as well as the public (including local neighborhoods) in carrying out engineering and environmental studies.

These elements and considerations formed the framework for the initial development of the site specific project alternatives presented in section 3.3.

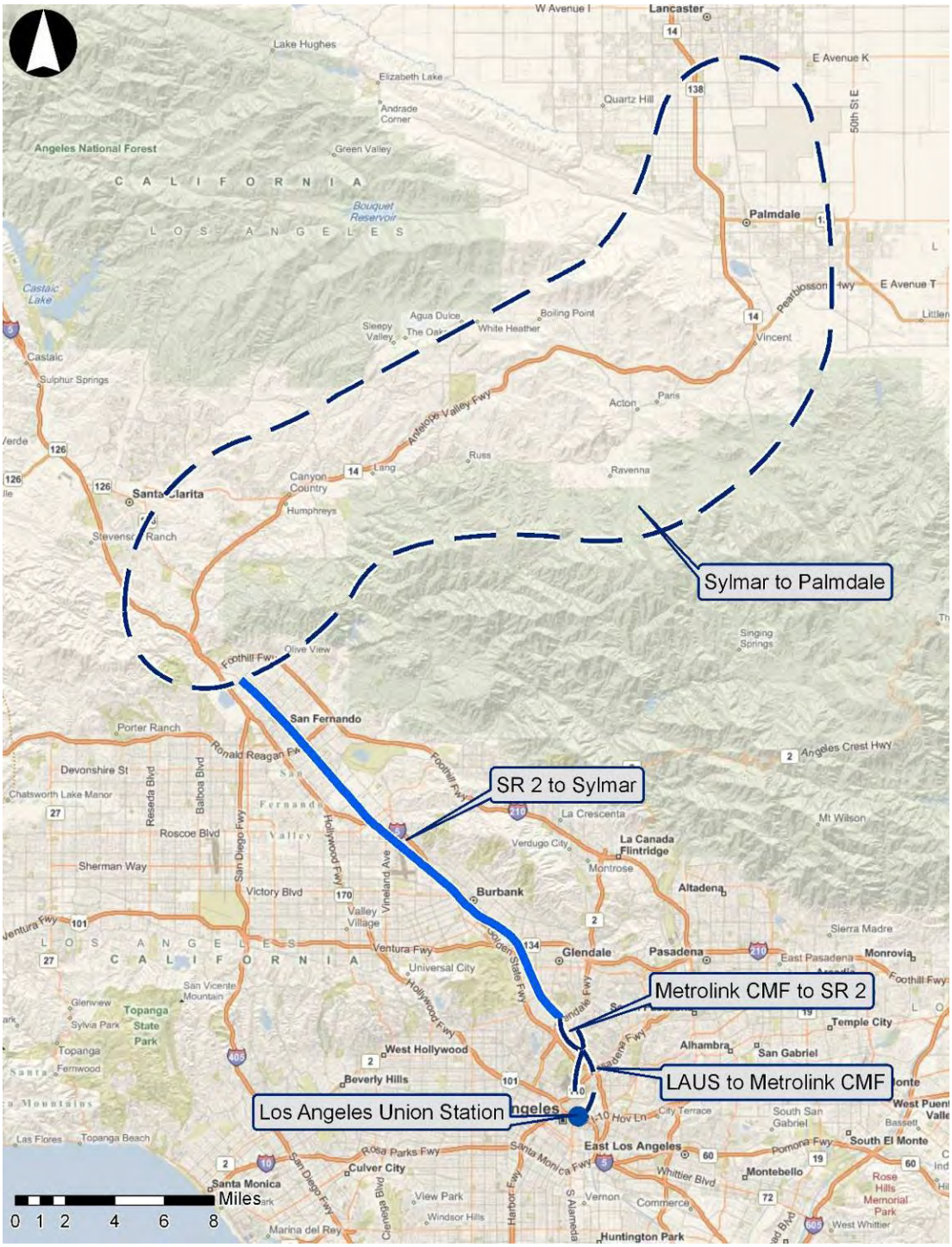
3.3 Initial Development of Project Alternatives

As part of the Palmdale to Los Angeles Alternatives Analysis process, the Authority has identified several variations to the selected program level corridor and station placements with the potential to mitigate impacts to communities, parklands, water and biological resources. Alternative horizontal alignments, profiles, track placements, and station placements have been considered at various points.

To facilitate the analysis of potential alignment alternatives, station locations and design options, the Palmdale to Los Angeles HST Section was divided into five subsections. The approximate geographic limits for each subsection were chosen at points where the HST alignment alternatives meet, such that alignment alternatives for each subsection may be “mixed and matched” with those from each adjacent subsection. The subsections are listed below, south to north and are shown in Figure 3.3-1:

- Los Angeles Union Station (LAUS) – covered in the Los Angeles to Anaheim section
- LAUS to Metrolink Central Maintenance Facility (CMF)
- Metrolink CMF to SR 2
- SR 2 to Sylmar
- Sylmar to Palmdale

Figure 3.3-1 Los Angeles to Palmdale Subsections



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The selected program level framework was further informed by:

- Elaboration of the HST design criteria.
- Improved information regarding existing topography.
- Improved understanding of the needs of MTA/Metrolink/Amtrak/UPRR.
- Involvement of and input from agencies, cities, communities and other stakeholders.

To meet the project's performance goals, the entire section of the HST from Palmdale to Los Angeles is to feature dedicated high speed rail tracks. All alternatives will have new tracks dedicated exclusively to high speed train operations. Dedicated tracks allow for the high speed operations required to realize the Authority's commitment to achieving a 2 hour 40 minute journey time between San Francisco and Los Angeles and enhance the reliability of service - keys to achieving the desired mobility and patronage levels. In addition, dedicated HST tracks:

- Remove operational dependencies among the HST, Metrolink and freight services.
- Provide a safer operating environment (no mixing of speeds and FRA-compliant and non-compliant trains).

The varying physical, development and topographic circumstances within the Palmdale to Los Angeles study area posed different challenges, offered different opportunities and resulted in different sets of alternatives along the corridor. These are presented below, geographically, from south to north.

3.3.1 Los Angeles Union Station

Los Angeles Union Station (LAUS) serves as the transportation hub for the Los Angeles region, serving Amtrak intercity trains, Metrolink commuter trains, Metro Red and Purple Line subway trains, Metro Gold Line light rail trains, and a variety of local and regional bus services. Union Station will serve as the northern connection of the Los Angeles to Anaheim HST Section, as well as the link to the HST system through the Inland Empire into San Diego.

The station serves as the starting point for all Palmdale to Los Angeles alternatives. As such, the station's placement and orientation will largely determine the corresponding linkages to the north. However, the station itself is being studied and reported on, separately and concurrently, within the Los Angeles to Anaheim Alternatives Analysis Report.

Station options were developed and described in the Anaheim to Los Angeles Alternatives Analysis Report, Revision 6, dated April 2009 and published June 2009. These were reflected in the LAUS to SR 134 Draft Alternatives Analysis Report, published June 2009, and now superseded by this Palmdale to Los Angeles Preliminary Alternative Analysis Report. Since then, in concert with feedback received through the Alternatives Analysis process, further options for LAUS have been developed. These are described in the Supplemental Alternatives Analysis report for the Los Angeles to Anaheim section to be published in July 2010.

Two options have emerged from this process, an elevated station above the existing Metrolink and Amtrak platforms, and an 'at-grade' station immediately to the west of a modified Metrolink/Amtrak LAUS station, within the existing station footprint. For a detailed description of these alternatives, and others which were considered and rejected, see the Los Angeles to Anaheim Supplemental Alternatives Analysis

Report. It is worth noting that tracks serving the 'at-grade' HST station would sit approximately 15 feet higher than the tracks serving existing LAUS, making it possible to consider elevated vertical alignments north of the at-grade station.

This report takes these two options as the basis for alternative alignments going north from LAUS, as described below. The station alternatives selected for advancement into its EIR/EIS at the conclusion of the Los Angeles to Anaheim Alternatives Analysis process will be the basis for advancing the corresponding LAUS alternatives into the Palmdale to Los Angeles EIR/EIS.

3.3.2 LAUS to Metrolink Central Maintenance Facility (Metrolink CMF)

Identification of Alternatives

The corridor alignment selected by the Authority and FRA with the Statewide Program EIR/EIS was the starting point for the identification of project alignment alternatives for this sub-section of the HST system. This relatively broad corridor connects LAUS to the Metrolink right-of-way running alongside their Central Maintenance Facility. The broad corridor includes a mixture of transportation corridors, commercial and industrial uses, parks and residential communities in a highly urbanized setting. There are also many historical structures and archaeological sites in this area. The development of alignment alternatives through the corridor considered the reasonableness and practicality of reaching the LAUS station alternatives being carried forward for consideration. Alternatives follow existing rights-of-way wherever possible to minimize impacts to surrounding communities and land use constraints, and planned developments.

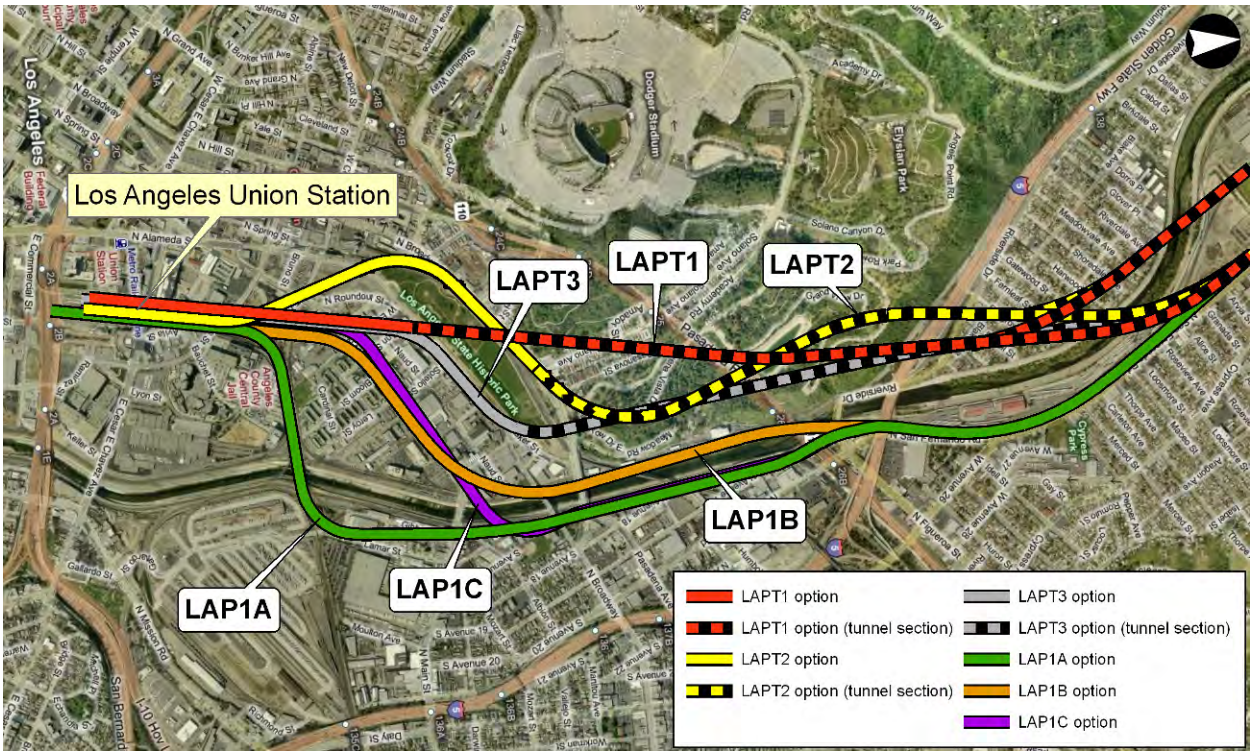
The alternatives within this area are conditioned by the existing dense urban fabric and the presence of the existing rail corridors approaching the LAUS transportation hub (Metrolink, Gold Line, arterial roadways) and the presence of the Los Angeles River.

A study objective was that alternatives should be compatible with future redevelopment along the Los Angeles River. A Los Angeles River Revitalization Master Plan (LARRMP) was developed by the City of Los Angeles Ad Hoc River Committee with the goal of exploring and developing opportunities to transform the river as we know it today into a vibrant greenway that connects and enhances the greater Los Angeles communities.

The LARRMP acknowledges the presence of rail operations within the redevelopment area and the presence of high-speed rail, without defining how they would coexist or what improvement would be necessary to permit rail operations. The Authority recognizes that alternatives heading north of LAUS through this highly urbanized area would require close consideration of the LARRMP to identify alternatives that included feasible measures to avoid or minimize potential impacts to the proposed re-development along the Los Angeles River and to other important community resources.

Working closely with public agencies, community groups, elected officials, and representatives of local communities, and building on the initial alternatives described in June 2009, the Authority developed six alignment alternatives leaving LAUS heading north and crossing I-5, as shown in Figure 3.3-2.

Figure 3.3-2 Alternatives from LAUS to Metrolink CMF



Alternative LAPT1 can only originate from an at-grade LAUS station – for an elevated station, the gradient required to enter tunnel before the Los Angeles State Historic Park (LASHP) "Cornfield" would exceed the maximum allowed by the design criteria. It would head due north from the station, passing over Vignes Street and descending under Main Street, to enter a tunnel at Spring Street. Other roads between Vignes Street and Spring Street would need to be closed or grade separated. It would transition from cut and cover to bored tunnel construction within LASHP. The bored tunnel would continue due north deep below the Elysian Park neighborhood and Elysian Park, curve gently northwest beneath I-5 and the southern tip of the Elysian Valley neighborhood, and align with San Fernando Road or the existing Metrolink tracks. It would surface at the south end of the Rio de Los Angeles State Park.

Alternative LAPT2 can originate from either an at-grade or elevated LAUS station. It would swing to the northwest to go around the west end of LASHP and to the northeast to fit between the Gold Line and Broadway. It would pass over Vignes, Main and Alameda Streets and the Gold Line on viaduct, and descend into a tunnel. It would transition from cut and cover to bored tunnel construction as it crosses Broadway. The bored tunnel would curve to the north deep below Elysian Park and the southern tip of the Elysian Valley neighborhood, and curve to the northwest to align with San Fernando Road or the existing Metrolink tracks. It would surface at the south end of the Rio de Los Angeles State Park in the same fashion as LAPT1.

Alternative LAPT3 can only originate from an at-grade LAUS station – for an elevated station, the gradient required to enter tunnel before the LASHP would exceed the maximum allowed by the design criteria. It would head due north from the station, passing over Vignes Street and descending under Main Street, then turn parallel to Spring Street in a partially covered trench. Other roads between Vignes Street and Spring Street would need to be closed or grade separated. It would transition from cut and cover to bored tunnel construction under Spring Street. The bored tunnel would continue due north below the LASHP and the Elysian Park neighborhood and Elysian Park, curve gently northwest beneath I-5 and the southern tip of the Elysian Valley neighborhood, and align with San Fernando Road or the existing Metrolink tracks. It would surface at the south end of the Rio de Los Angeles State Park.

Alternative LAP1A would originate from either an elevated or an at-grade LAUS station. It would run on viaduct (climb on to viaduct from the at-grade station) above the existing Metrolink from the north end of the station and across the Los Angeles River on a long-span bridge, and join the existing railroad corridor along the east side of the river to maximize use of the existing rail footprint and minimize impacts on abutting development and the Los Angeles River. However, the curvature required for HST operations creates a sweeping turn on the east bank that takes the HST alignment well outside the existing rail corridor and into private property between the river crossing and Main Street. The HST alignment would be placed on viaduct to avoid undermining historic Main Street Bridge, and avoid demolition of the historic Spring Street and Broadway bridges. An alignment at-grade and in trench between Main Street and SR 110 was initially considered, but would have been in an area of potential flooding and would have impacted the existing historic bridges. It would pass over the Gold Line Bridge and drop to grade beneath the SR 110 and I-5 bridges.

Alternative LAP1B would originate from an elevated or an at-grade LAUS station and run on viaduct above Main Street. It would then turn and run along the west bank of the Los Angeles River on viaduct passing over Spring Street and North Broadway Street before descending to grade near the Metro Gold Line Yard. It would then cross the river south of I-5 at a high skew at the location of the existing Metrolink bridge.

Alternative LAP1C would originate from an elevated or an at-grade LAUS station and run on viaduct over Main Street and across the river between Main Street and Spring Street, then join the LAP1A alignment.

LAP1A, LAP1BA, LAP1C converge just north of I-5.

Initial Review of Alternatives

Three tunnel options were developed. A tunnel option may be most consistent with the Los Angeles River Revitalization Master Plan by minimizing impact to the river area and has been favorably received by local public agencies including the City of Los Angeles Planning Department and Mayor's office and interested stakeholders.

Alternative LAPT1 is associated and only compatible with the at-grade LAUS. The long term impacts associated with this alternative are concentrated between Vignes Street and Spring Street, necessitating some rerouting and/or vertical adjustments of streets in the intermediate zone. It would cause short term impacts on LASHP, where the cut and cover construction imposed by the shallowness of the tunnel would occupy park land but would allow full surface reinstatement of the park after construction completion. It follows a direct route giving potential journey time savings and avoids interfaces with the existing historic structures crossing the Los Angeles River.

Alternative LAPT2 is associated with both the elevated and at-grade LAUS. It traverses Vignes Street, Main Street and Spring Street on viaduct that skirts the north end of LASHP and drops between the Gold Line and North Broadway Street into a tunnel that takes it under North Broadway Street and Elysian Park. The primary long term impact is the visual obtrusiveness of the viaduct. The effect on community cohesion is less of an issue along North Broadway Street, since the Gold line already parallels the road. There would be short term impacts on North Broadway Street due to cut and cover tunnel construction which would need to occupy parts of the street in staged segments. Alternative LAPT2 provides the benefits associated with a tunnel alignment to the elevated alternative station at LAUS.

Alternative LAPT3 is associated and only compatible with the at-grade LAUS. The long term impacts associated with this alternative are concentrated between Vignes Street and Spring Street, necessitating some rerouting and/or vertical adjustments of streets in the intermediate zone. Displacements are greater than for LAPT1 but impacts on LASHP are minimized. It avoids visual impacts on the existing historic structures crossing the Los Angeles River.

Alternative LAP1A follows the existing rail infrastructure corridor from Union Station along the east bank of the river to the I-5. The crossing of the Los Angeles River has to be at a moderate skew because no columns can be placed in the river in an area already subject to flooding without making corresponding changes to the river channel to mitigate the effect of the columns on flow capacity. A very long span, sharply curved, bridge is not a viable solution to carry high speed trains in a seismic zone. This means that some properties on the east side of the river would be significantly affected. Also, the existing Metrolink right-of-way and the spans of the existing historic bridges are not wide enough to accommodate Metrolink and HST tracks side by side.

The HST alignment would therefore be placed on viaduct avoiding the at-grade crossing with historic Main Street Bridge, and avoiding demolition of the historic Spring Street and North Broadway Street bridges. The elevated alignment would avoid impacting an area potentially subject to flooding. Because the right-of-way is narrow, a number of properties to the east of the right-of-way will be marginally affected by this viaduct. The viaduct would then cross over the Gold Line Bridge and drop to at-grade before crossing beneath the SR 110 and I-5 bridges. San Fernando Road would need to be reconfigured to fit HST tracks beside the Metrolink tracks alongside the CMF. Alternative LAP1A can be compatible with either the elevated or at-grade station option at LAUS, and by following the existing rail infrastructure it avoids creating new obstacles to the community.

The west bank alternative LAP1B runs on viaduct for several hundred feet along Main Street. This route passes through a commercial area and near residential areas which includes the Ann Street elementary school (located at 126 Bloom Street). As the alignment turns along the west bank of the river it continues on viaduct over Spring Street, North Broadway Street and the Gold Line. The alignment would displace some commercial properties along the turn. As it drops to grade to pass below SR 110, the alignment would be squeezed within the active and fully occupied railroad right-of-way along the west bank of the Los Angeles River including the Gold Line yard, and would cut off southern access to the Metrolink Central Maintenance Facility from the Metrolink tracks. The lack of space would necessitate the relocation of Metrolink tracks between the Gold Line and I-5, with attendant operational and service issues during construction, and long term and constructability implications in the form of a new, additional, highly skewed river crossing. San Fernando Road would need to be reconfigured to fit HST tracks beside the Metrolink tracks alongside the CMF.

Alternative LAP1C combines the initial alignment of LAP1B with an earlier crossing of the Los Angeles River to the east bank. It would have similar impacts to Alternative LAP1B in terms of impacts to commercial and residential areas, including the school. It needs to cross the river on a curve and at a skew. By limiting the skew, a wide and long span (400 feet) through truss girder bridge adjacent to the historic Main Street bridge can be used, but some property acquisition on the east bank would be required. On the east bank of the river the HST alignment would be placed on viaduct, avoiding demolition of the historic Spring Street and North Broadway Street bridges. The elevated alignment also avoids impacting an area potentially subject to flooding. Because the right-of-way is narrow, a number of properties to the east of the right-of-way would be marginally affected by this viaduct. The viaduct would then cross over the Gold Line Bridge and drop to at-grade before crossing beneath the SR 110 and I-5 bridges. San Fernando Road would need to be reconfigured to fit HST tracks beside the Metrolink tracks alongside the CMF. Alternative LAP1C can be compatible with either the elevated or at-grade station option at LAUS, and by following the existing rail infrastructure on the east bank it avoids creating new obstacles to community cohesion.

No alternatives were withdrawn from consideration in this subsection.

3.3.3 Metrolink CMF to SR 2

Identification of Alternatives

Between Metrolink CMF and SR 2, alternative development needed to consider the Los Angeles River, the Metrolink Depot, Rio De Los Angeles State Park and construction of a new high school campus between the River and San Fernando Road. Two alignments were developed as interchangeable extensions of LAP1A, LAP1B and LAP1C:

- An alignment following the existing Metrolink tracks
- An alignment following San Fernando Road.

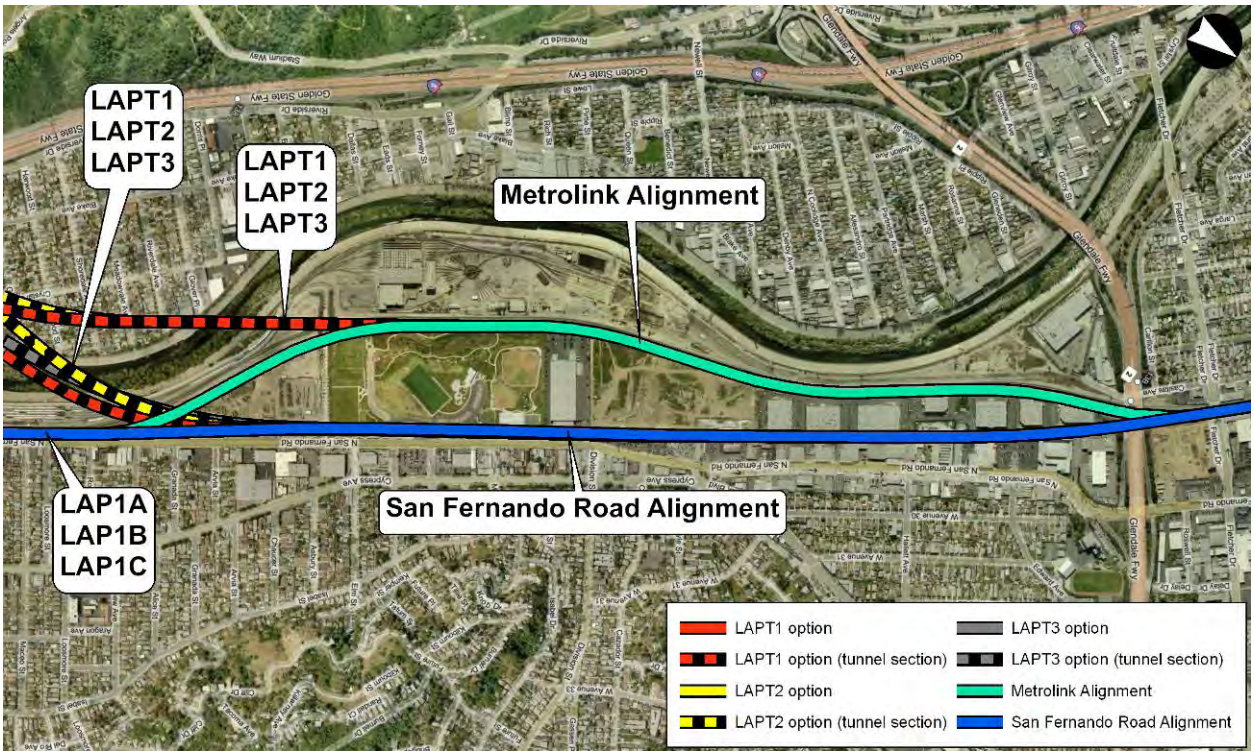
The tunnels for LAPT1, LAPT2 and LAPT3 can be aligned to match either of these options.

For the San Fernando Road alternative the tunnels for the different options cross under the Los Angeles River in close proximity to one another and reach a common portal at the south end of the Rio de Los Angeles State Park (RDLASP). From the portal to SR 2, the extension of the tunnel alignment follows San Fernando Road.

For the Metrolink alignment the tunnels cross under the Los Angeles River further north than for the San Fernando Road option and reach a common portal part of the way along the RDLASP.

The alternative horizontal alignments are shown in Figure 3.3-3.

Figure 3.3-3 Alternatives from Metrolink CMF to SR 2



The San Fernando Road alignment alternative would have the HST tracks depressed in trench through the area for all options. An at-grade alignment would have had noise and visual impacts on the park and the new Central Region High School No. 13 at the north end of the park, and would have severed and blocked access to the park from San Fernando Road and the community.

For the existing Metrolink alignment alternative, the HST tracks for alternatives LAP1A, LAP1B and LAP1C could be at-grade or depressed in a trench (the tunnel alternatives would need to be in a trench).

For either alignment, the Metrolink/freight tracks could be relocated in a trench alongside the HST tracks, separated by a suitable barrier, though Metrolink and UPRR have indicated that there are safety and operational issues that would have to be resolved for this to occur, and Metrolink's connection to the north end of its Central Maintenance Facility would have to be modified for the San Fernando Road alignment alternative.

Viaducts in this area were considered but analysis showed noise and visual impact on the park and new high school, and during community outreach these, and the barrier that viaducts were seen to impose between the surrounding neighborhoods, the park and the river, were areas of serious concern. Elevated options were therefore not investigated further.

The trench along either the Metrolink or San Fernando Road alignments would be partly covered for lengths of up to 800 feet (based on ventilation and emergency evacuation considerations), to improve connectivity in general and pedestrian and vehicular access, favor recreational and landscaping enhancements, and allow for compatible uses. The partially covered trench would continue beyond the

park past the school, before the alignment rises to pass beneath the SR 2 at-grade, using the existing bridge.

Beside the Rio De Los Angeles State Park, the trench for the tunnel alignment would be climbing steadily from the deeper profile associated with bored tunnel construction.

Initial Review of Alternatives

The alignment along San Fernando Road would have greater impact on the properties facing San Fernando Road, including the park and the new high school, but placing the HST line in a trench minimizes permanent and operational impacts and it would be possible to further reduce severance impacts by covering parts of the trench. It would also allow higher HST speed through this section.

The at-grade alignment along the existing Metrolink alignment minimizes impact on the existing park and other properties along San Fernando Road, but creates an additional obstacle between the park and the Los Angeles River. Putting the HST in a partially covered trench would avoid this effect, and the benefit would be greater if the Metrolink tracks could also be put in a trench, however this is problematic. The alignment following the existing Metrolink alignment would permanently restrict the speed for HST particularly for the LAP1A, LAP1B and LAP1C alignments. An at-grade solution is only compatible with the LAP1A, LAP1B and LAP1C alignments from LAUS.

No alternatives were withdrawn from consideration in this subsection.

3.3.4 SR 2 to Sylmar - Introduction

Between SR 2 and Sylmar, all alternatives closely follow the existing Metrolink Antelope Valley Line right-of-way as selected by the Authority and FRA in the statewide Program EIR/EIS. The following considerations guided the development of the alternatives:

- Dedicated, grade separated HST tracks are to be provided for the entire length.
- Allowance is to be made for two Metrolink tracks for the entire distance.
- HST station sites may be considered at locations including Burbank and Sylmar / San Fernando.
- Consider relocating nearby Metrolink platforms to create joint HST-Metrolink stations.

The key variables in the identification of the initial array of alternatives were:

- The placement of the HST tracks relative to Metrolink tracks and right-of-way.
- The trade-offs between design speed and community/environmental impacts where curved portions of alignments based on desired and operational speed criteria could veer outside the available right-of-way.
- Profile gradient criteria, ride quality (passenger comfort), and operational considerations.
- The most effective means of grade separating existing at-grade crossings.
- Identifying station locations to satisfy ridership, connectivity, transit oriented development, community and operational/geometric requirements.

In the course of design development, four groups of alternatives were identified for initial study:

- HST Track Locations - four alternatives for locating the HST tracks relative to the Metrolink tracks and right-of-way, discussed in section 3.3.5;
- Design Speed - three horizontal alignments corresponding to different design speeds, discussed in section 3.3.6;
- Vertical Alignment - three profile alternatives, discussed in section 3.3.7;
- Station Locations – the initial investigations focused on Burbank and Sylmar, as recommended in the program level EIR/EIS. Agency and community feedback and engineering constraints led to the identification of other potential sites. These are discussed in section 3.3.8.

3.3.5 SR2 to Sylmar – HST Track Location Alternatives

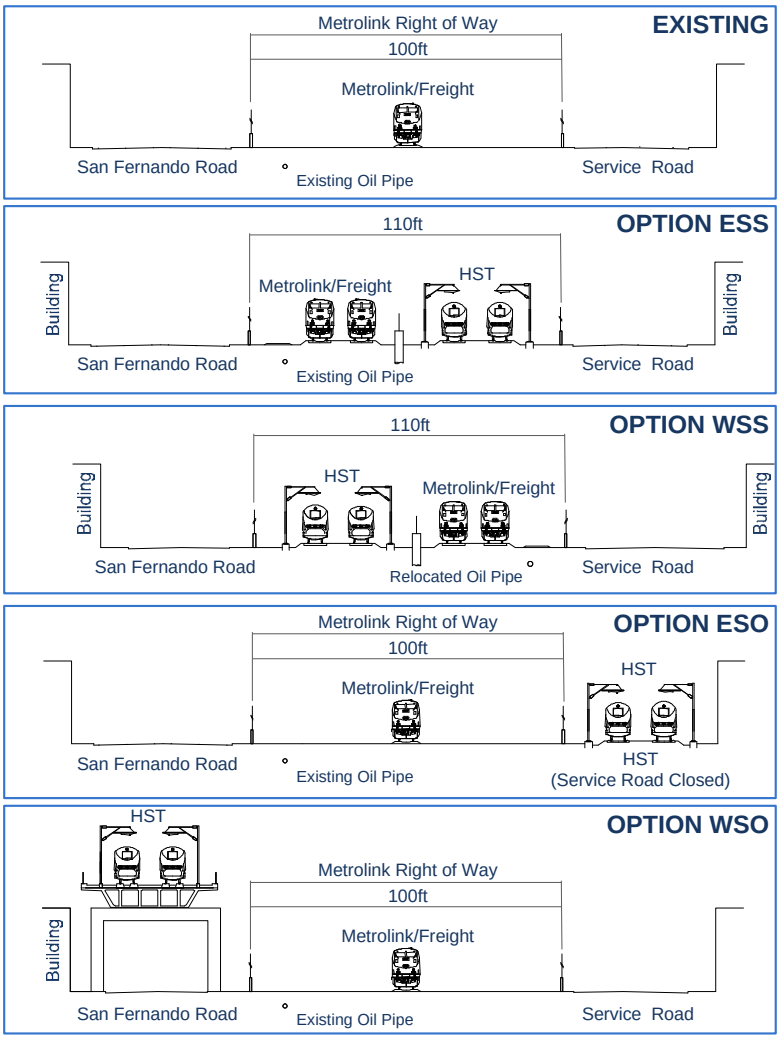
Identification of Alternatives

To establish the optimum location for the HST tracks along the selected route, four alternatives representing a range of potential track locations associated with the Antelope Valley Line corridor were investigated:

- **Alternative WSS** (West Side Shared) – HST tracks on the west side of the Antelope Valley Line right-of-way with the Metrolink tracks on the east side, sharing the right-of-way
- **Alternative ESS** (East Side Shared) – HST tracks on the east side of the Antelope Valley Line right-of-way with the Metrolink tracks on the west side, sharing the right-of-way
- **Alternative WSO** (West Side Outside) – HST tracks outside and west of the existing Antelope Valley Line right-of-way
- **Alternative ESO** (East Side Outside) – HST tracks outside and east of the existing Antelope Valley Line right-of-way

The four track locations were evaluated with respect to constructability, cost, displacements, and environmental impacts.

Figure 3.3-4 SR 2 to Sylmar HST Track Location Alternatives



Initial Review of Alternatives

The two shared right-of-way alternatives (ESS and WSS) have much in common, and have comparable advantages and constraints most of the way through the San Fernando Valley. Both options require relocation of the existing Metrolink/freight tracks to one side of the right-of-way over the full length between SR2 and Sylmar. Phasing of this work to minimize disruption to existing train services will be a major constraint. The primary differences between ESS and WSS are where the HST tracks join and leave the Metrolink right-of-way and where Metrolink or freight tracks leave the main right-of-way:

- HST tracks join the right-of-way from the east side before SR 2
- The Ventura Line branches to the west at Burbank Junction
- Vulcan quarry has a loop siding to the east of the right-of-way north of Tuxford Road
- A plywood factory has a spur to the east north of SR 118

- HST tracks leave the right-of-way to the east side north of Sylmar

Since the HST must be fully separated from Metrolink/freight tracks, a long HST viaduct would be needed wherever the tracks cross. Burbank Junction is close to a series of road over bridges (Burbank Boulevard, Magnolia Boulevard, Olive Avenue and the I-5) and so alternative WSS would require a viaduct about three miles long and elevated 60 feet above ground crossing over all of these road bridges.

Viaducts would also be needed for alternative WSS at SR 2 and north of Sylmar to take HST over the Antelope Valley Line as it joins and leaves the right-of-way. Alternative ESS would avoid all these viaducts but would create challenges in serving the two existing rail freight customers on the east side of the right-of-way. Initial review found no current freight customers on the west side of the corridor. Placing the HST line on either side of the alignment requires consideration of effects to access for potential future freight customers.

Alternative WSS is not being carried forward because of the additional long, high, and visually intrusive structures required. Alternative WSS would also require relocation of the oil pipeline and communications utilities that run along the west side of the existing right-of-way for much of its length. Alternative ESS is being carried forward with the understanding that adjustments may be needed to locally as a result of discussions with existing freight customers and UPRR to maintain or provide alternative access. These provisions would have less impact than the viaducts required for Alternative WSS.

The other two alternatives, ESO and WSO, would place the HST outside of the existing right-of-way. These alignments would provide greater separation between the HST and Antelope Valley Line tracks and avoid relocating existing tracks and the existing oil pipeline running within the rail right-of-way. The alternatives would however require relocation of utilities running in the roads and would require displacement of a large number of commercial, industrial, and residential properties.

For the majority of the route, the rail right-of-way is bounded by San Fernando road on its west and a service road to its east. It may be possible to displace the service road and construct the HST at-grade on the east side, but it would be impractical to displace the more heavily utilized San Fernando Road with the attendant community and property impacts. Therefore, to maintain the road the WSO alternative would require long lengths of viaduct or cut-and-cover tunnel construction with associated environmental and cost impacts. Portions of the ESO alternative may be constructed at-grade where the service road exists and is not greatly utilized, but over much of the route there are frontage roads or properties adjacent to the right-of-way. This alternative would therefore still require greater lengths of viaduct or trench construction and more displacements than either of the shared right-of-way alternatives.

Either of the two outside of right-of-way alternatives would be constructed closer to residential areas than either of the shared right-of-way alternatives. In addition, the outside alternatives would displace several commercial and industrial structures that would otherwise screen the project from nearby residential areas. These factors would increase the magnitude of noise and visual impacts caused by the HST project. For these reasons, ESO and WSO are not further considered.

3.3.6 SR 2 to Sylmar - Design Speed/Horizontal Alignment Alternatives

Identification of Alternatives

The ability to fit the HST tracks within the existing Metrolink Antelope Valley Line is constrained by the line's curvature. Higher speeds require flatter curves and greater distance to affect changes in direction,

making it more challenging to fit the HST within a lower speed corridor. To assess the implications of the desired design speed on the existing Metrolink corridor and abutting uses, the following alternative was identified for development:

- **220 mph alignment –** using minimum curve criteria corresponding to the proposed HST operating speed and similar to the design speed of the program EIR/EIS alignment

To investigate the potential for reductions in impacts that may result from less stringent geometry at curved sections of the route the following horizontal alignment alternative was also identified:

- **Hybrid speed alignment** – this would feature progressively increasing design speeds from south to north, aimed at minimizing journey times while also minimizing bridge replacements and right-of way acquisition.

All options are limited to a 140 mph section between SR 2 and Sonora Avenue, governed by the speed achievable between LAUS and SR 2 and the need to pass beneath the SR 134 bridge.

Initial Review of Alternatives

Purpose and need statement for the HST system calls for competitive travel times, and a maximum nonstop travel time of 2 hours, 40 minutes between San Francisco to Los Angeles Union Station is required California law set in Proposition 1A passed in 2008. Where the alignment is unconstrained, the fastest operating speeds possible are planned to minimize travel time. The program EIR/EIS alignment had a design speed of 140 mph between SR 134 and the North San Fernando Boulevard underpass, and increased to 220mph north of this road crossing. Potential right-of-way impacts were estimated for each alignment through the application of standard cross-sections.

The hybrid alternative would feature increasing design speeds from south to north, aimed at minimizing journey times while also avoiding bridge replacements and minimizing right-of way acquisition. The progressive design speed profile would be:

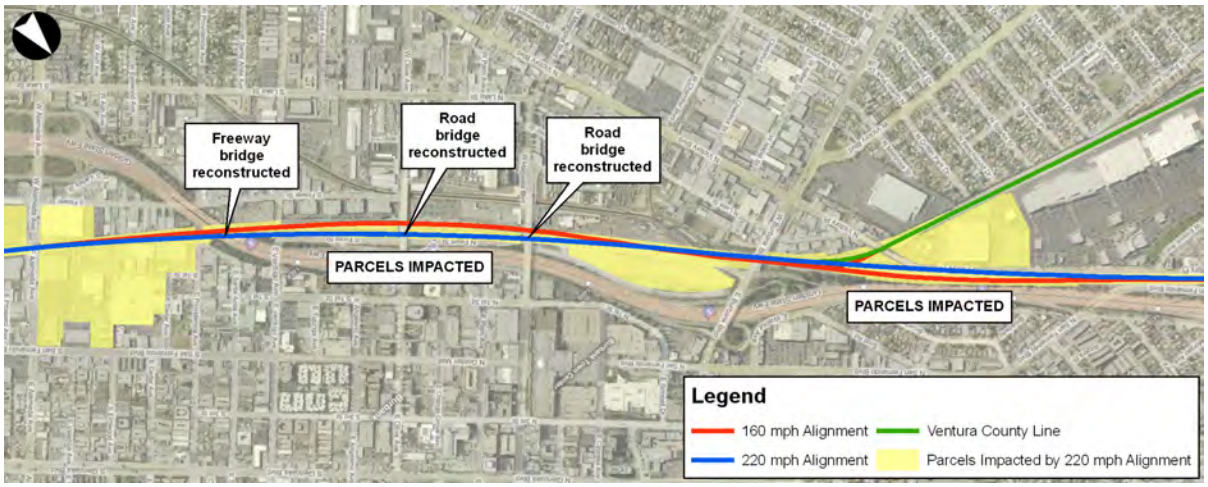
- 140 mph between SR 2 and Sonora Avenue—the 140mph speed restriction is caused by the desire to pass under the existing SR 134 bridge;
- 160 mph between Sonora Avenue and North Buena Vista Street—the 160 mph speed restriction is caused by the desire to pass under the existing bridges in the Burbank area;
- 210 mph between North Buena Vista Street and Tuxford Street—the 210 mph speed restriction is caused by the desire to pass under the existing I-5 bridge;
- 220 mph between Tuxford Street and Bledsoe Street.

This gives a journey time approximately 15 seconds longer than the 220 mph alignment.

The impacts of the uniform 220 mph alignment alternative could be significant in the Burbank area between Alameda Avenue and Tuxford St requiring additional land acquisition due to the larger radius curves that would place the HST tracks outside the Metrolink right-of-way. A number of overbridges, including I-5 overbridges, would need to be reconstructed.

Figure 3.3-5 shows the possible additional impact for adopting a design speed of 220 mph at this location. These large impacts are not justified by the small saving in journey time which would result from adopting a 220 mph alignment and so only the hybrid alignment will be taken forward.

Figure 3.3-5 Impacts of 220 mph Design Speed in Burbank



3.3.7 SR 2 to Sylmar - Vertical Alignment Alternatives

Identification of Alternatives

A key issue for any proposed vertical alignment for the SR 2 to Sylmar subsection is how the existing at-grade road crossings of Antelope Valley Line tracks are addressed, because no at-grade crossings are permitted for the HST tracks. Three vertical alignment alternatives represent the widest range of conceptual possibilities and associated impacts:

- A fully elevated profile would carry the proposed high-speed tracks over all obstacles.
- A fully at-grade profile would place the proposed high-speed tracks at a similar elevation to the existing Metrolink tracks, with existing street crossings elevated over or depressed under the tracks.
- A fully depressed profile would carry the proposed high-speed tracks in a trench or tunnel under all obstacles.

Initial Review of Alternatives

In addition to the existing at-grade crossings, other constraints on the alignment need to be considered when formulating practical vertical alignment alternatives:

- A number of freeways and arterial roads cross over the right-of-way on bridges. To take HST over these structures would require very high viaducts and, particularly for the freeway crossings, very long spans. Since these would be visually obtrusive and expensive to construct, an elevated profile will not be considered at these locations. To take HST under these structures in a trench would require reconstruction of the existing bridges because the foundations would be undermined by trench construction, and considerable disruption to utilities within the right-of-way and in crossing streets, and so this alternative will not be considered in these locations either. Wherever possible the HST tracks and realigned Metrolink tracks will be fitted through existing bridge spans at-grade.
- A number of arterial roads and watercourses (washes) cross beneath the existing Metrolink tracks, which are carried on rail bridges. A trench passing beneath these structures would be impracticable

as they would have to be very deep, up to approximately 60 feet, and would be very disruptive, expensive and difficult to construct.

- The alignment passes close to two airports in this section, an elevated profile would infringe airspace clearance envelope set by federal regulation and is unacceptable at these locations.
- The alignment crosses the active San Fernando Fault, an at-grade section is highly preferred to minimize the recovery time after a seismic event where ground rupture has occurred.

These constraints make a generally at-grade profile preferable. Where there are at-grade crossings and the alignment is not otherwise constrained, elevated or depressed alternatives noted above can be considered. The three vertical alignment alternatives to be carried forward for further evaluation have been refined as follows:

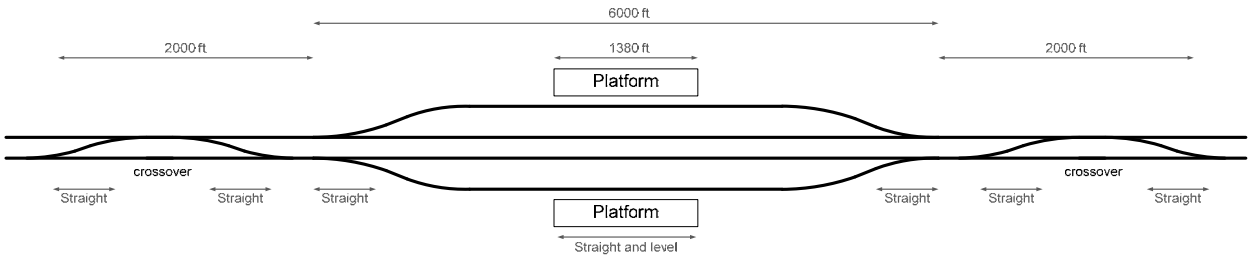
- Profile A – A predominantly at-grade profile, elevated where there are at-grade crossings
- Profile B – A predominantly at-grade profile, with roads elevated, depressed or closed.
- Profile C – A predominantly at-grade profile, depressed where there are at-grade crossings

These three vertical profile alternatives are being carried forward for further refinement and evaluation because they represent the complete range of possible vertical alignments and none contain significant constraints. The final alignment in this part of the system may involve some combination of these three profiles.

3.3.8 SR 2 to Sylmar - Station Alternatives

Stations on the proposed high-speed line will be located on sections of the route that are approximately level (maximum gradient of 0.25%), straight, and comprised of four HST tracks. Straight platforms are required to limit the gap between the train to meet ADA and safety requirements. The two additional HST tracks in the station areas allow local services to stop without impeding and delaying express services. The four-track section would extend approximately 6,000 feet to allow for train deceleration and acceleration. A universal crossover is needed at each end of the station, requiring an additional 2000 feet of straight track at each end (See Figure 3.3-6).

Figure 3.3-6 Typical Station Track Layout



Identification of Alternatives

Initial Station Location Options

The preferred station locations for the HST within the SR 2 to Sylmar section were identified in the program EIR/EIS as Burbank and Sylmar. The existing Burbank Metrolink station is on a curved section

of track (see Figure 3.3-7). The existing Sylmar/San Fernando Metrolink station is located immediately to the north of a curve (see Figure 3.3-8), where the HST alignment requires a flatter and longer curve that extends through the current Metrolink station, rendering it unsuitable for HST purposes. This existing station also lies within the Alquist Priolo Zone associated with the San Fernando Fault. Adjusting the alignment to incorporate straight sections of track would require the HST alignment to leave the Metrolink right-of-way, requiring additional displacements and, at Burbank, the reconstruction of a number of existing overbridges as shown in Figure 3.3-9. Therefore, the existing Burbank and Sylmar Metrolink station locations were not considered further, and the nearest straight track sections north and south were investigated as possible HST station sites:

- Burbank South (9.6 miles from LAUS)
- Burbank North (10.7 miles from LAUS)
- Sylmar/San Fernando (21.1 miles from LAUS)
- Sylmar North (22.7 miles from LAUS)

Figure 3.3-7 Existing Burbank Station

Figure 3.3-8 Existing Sylmar Station

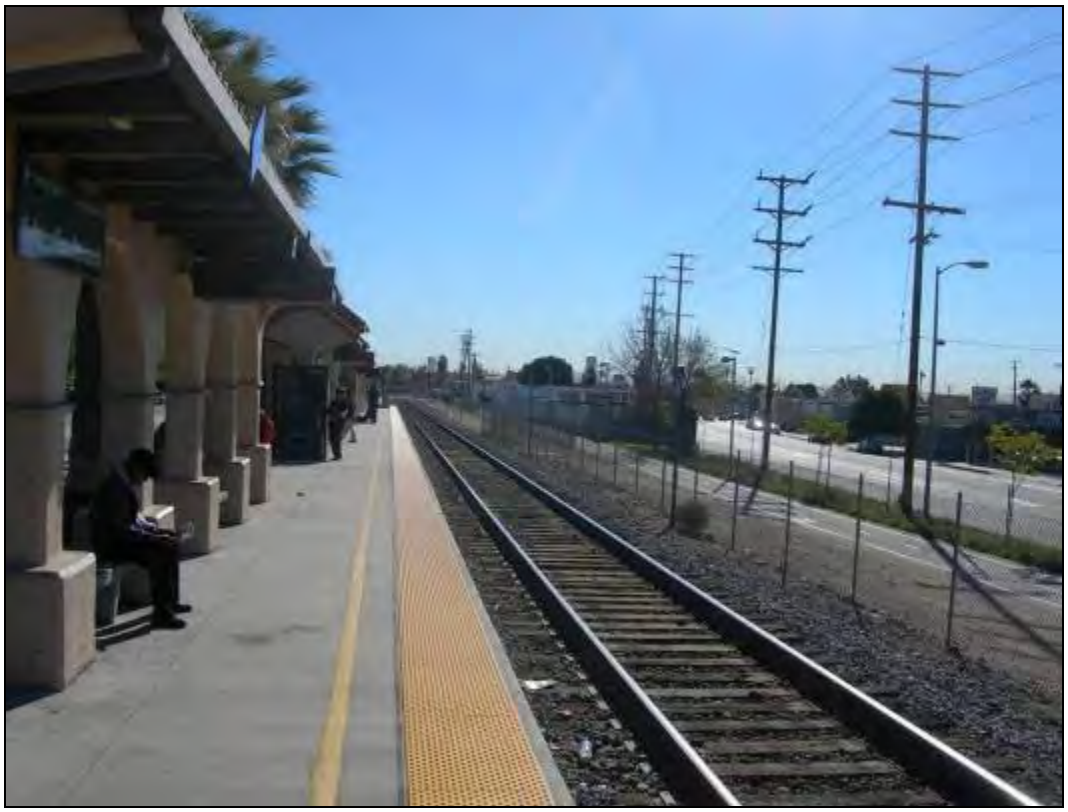
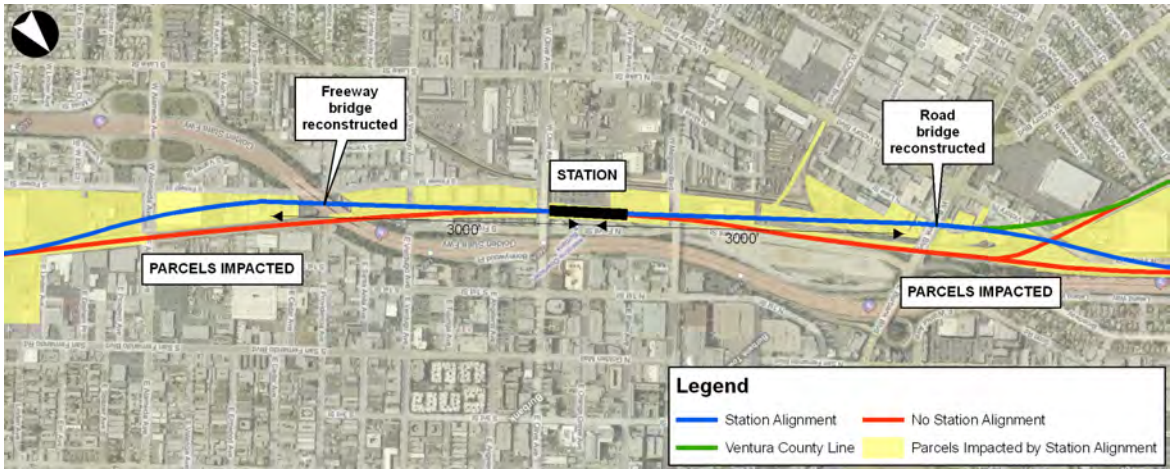


Figure 3.3-9 Effects of Locating HST Station at Existing Burbank Metrolink Station



Additional Station Location Options

Suggestions received at outreach sessions and engineering connectivity and development opportunity considerations led to the identification of five additional sites as potential station locations, covering a spectrum of possibilities between Burbank and Sylmar:

- Burbank Buena Vista, between North Buena Vista and North Hollywood Way (12.8 miles from LAUS)
- Hollywood Way, between Hollywood Way and Arvilla Avenue (13.2 miles from LAUS)
- Sunland Boulevard, centered on Sunland Blvd. (14.7 miles from LAUS)
- Branford Street, between Tujunga Wash and Branford Street (17.3 miles from LAUS)
- Pacoima Wash, centered on SR 118 (20.2 miles from LAUS)

Figure 3.3-10 Station options (north)

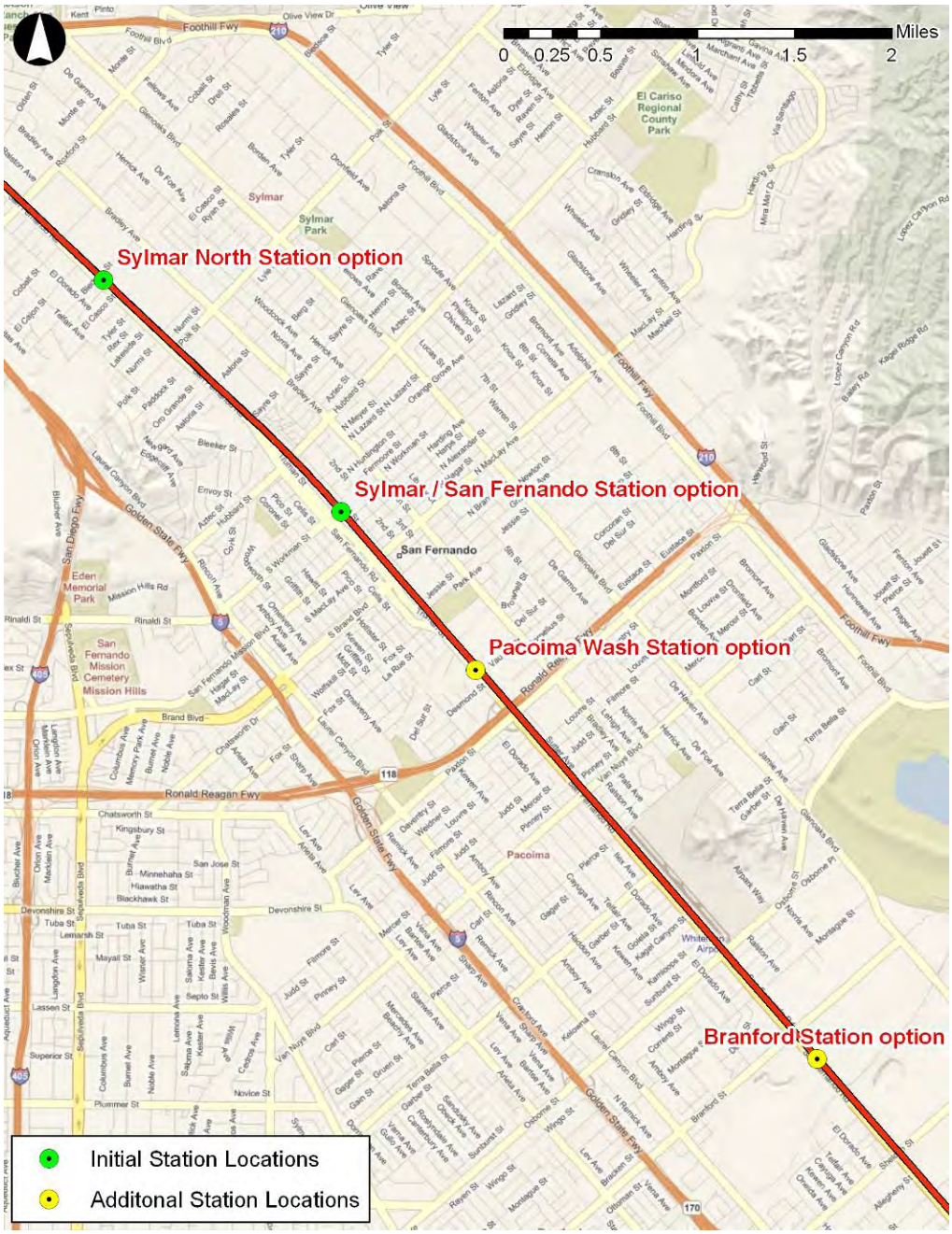
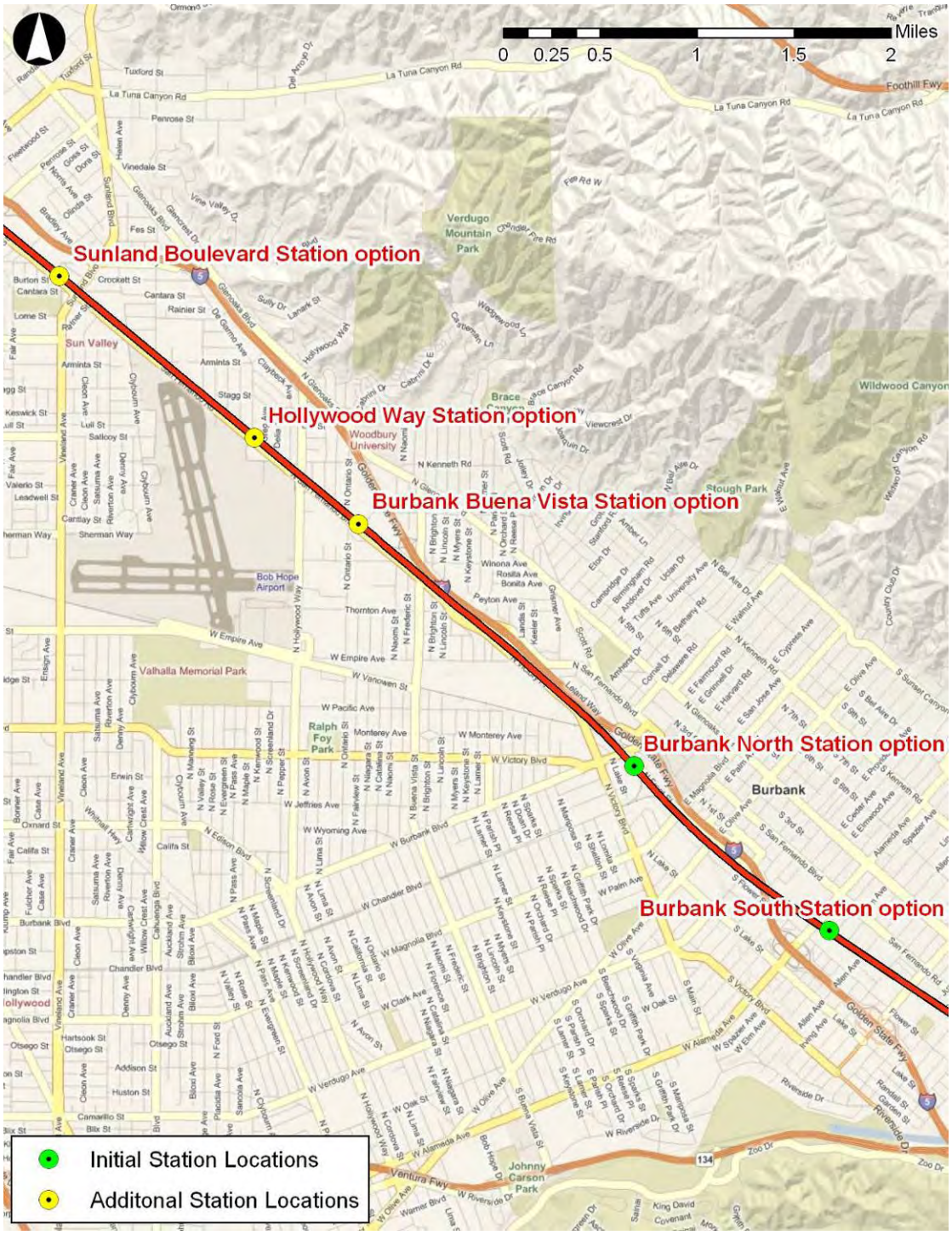


Figure 3.3-11 Station options (south)



Initial Review of Alternatives

As detailed in section 3.4, the Authority is building relationships with city staff and key stakeholders in each of the cities along the San Fernando Valley. City perspectives about stations include:

- City of Glendale – The City favors an HST station within or close to Glendale but also has general concerns about intermodal connectivity especially with regard to the Bob Hope Airport and duplication of systems and services within the County of Los Angeles including Metrolink, Amtrak and the HST.
- City of Burbank – The City has concerns about station location and community disruption especially with regard to their downtown hub, currently surrounding the Metrolink station, and right-of-way encroachment into neighborhoods. The City wants cut-through traffic between SR 134 and I-5 that is related to any potential HST station minimized. The City prefers that the existing Metrolink station not be moved to co-locate with the HST station. City staff indicated that the Burbank South station option would impact new planned infrastructure. The City requested consideration of a station closer to Bob Hope Airport to allow effective intermodal connections, or alternatively a station located at the existing Metrolink station location.
- City of San Fernando – The City is supportive of a station within the City and noted convenient access to three local freeways.
- City of Los Angeles (Sylmar) - The north valley planners are supportive of a station located in the City in the northern part of the valley that would offer simple freeway access and development of commercial zones.

In parallel with outreach efforts, ongoing design development identified flaws with some of the locations considered:

- Burbank South and Burbank North - Long straight four track runs, as required for effective station operation, would result in considerable deviation (hundreds of feet over several miles) from the existing railroad right-of-way at both sites, with significant impacts on the abutting land uses (similar to the effects shown for the Burbank Metrolink location in Figure 3.3-9). Ridership forecasts show that boardings at either Burbank site will be low compared to other stations (less than one third of the boardings at either Sylmar station). This is because of the proximity to Los Angeles Union Station which has a wider range of trip options. For these reasons, these locations are not being considered further.
- Hollywood Way - This location and Buena Vista station location are adjacent. To provide level platforms and limited grades for track turnouts and crossovers, the Hollywood Way station would require extensive lengths of depressed profile at depths of 60 feet to the north of the station, disproportionally increasing both construction and operational complexity, impacts and costs. Thus this alternative has been dropped from further consideration.
- Sunland Boulevard - The station would require extensive lengths of depressed profile at depths of 60 feet, to avoid a conflict with the Bob Hope Airport flight clearance envelope, and would require reconstruction of the I-5 bridge over the right-of-way, disproportionally increasing both construction and operational complexity, impacts and costs. There is also limited transit orientated development

opportunity at this location without impacting homes and Sun Valley Park. Thus this alternative has been dropped from further consideration.

- Sylmar North - The Santa Susana fault lies to the north of the station site and the San Fernando fault lies to the south. The gradient needed in order to cross both these fault at-grade, as required by seismic considerations, is too steep and fails to meet design criteria for level tracks at stations. Thus this alternative would not be studied further.

As a result of the outreach, design, and initial review processes, the candidate station locations to be carried forward for further evaluation in section 4 of this Alternatives Analysis Report are:

- Burbank Buena Vista (12.8 miles from LAUS, in proximity to Bob Hope Airport)
- Branford Street (17.3 miles from LAUS centrally located in the San Fernando Valley)
- Pacoima Wash (20.2 miles from LAUS close to the SR 118 freeway)
- Sylmar/San Fernando (21.1 miles from LAUS within the City of San Fernando)

3.3.9 Sylmar to Palmdale - Introduction

The following considerations, together with input from agencies, elected officials, and stakeholders, formed the basis for the development of initial alternatives in the Sylmar to Palmdale subsection:

- This portion of the HST alignment is to follow the broad corridor presented in the programmatic EIR/EIS.
- HST stations are to be considered at Santa Clarita, Palmdale, and Lancaster.
- Dedicated, grade-separated HST tracks are to be provided for the entire length.
- Acceptable track gradients are to be maintained through the rugged mountainous terrain.
- Displacements, impacts, and acquisitions are to be minimized.

Preliminary engineering design of site-specific alignment alternatives along the EIR/EIS programmatic corridor found that relatively long tunnels would be necessary at specific areas. Some of the key considerations in the identification of initial alternatives were:

- Current HST design criteria.
- Refined designs that best-fit through mountainous areas and avoid key geographic features such as Acton Downtown area and Lake Palmdale
- The trade-offs between design speed and community/environmental impacts.
- Constraints posed by station locations.

3.3.10 Sylmar to Palmdale –Alignment Alternatives

Since a broad corridor was identified in the Program EIR/EIS, the Authority identified and characterized a range of potential HST alignments between Sylmar and Palmdale across a broad area.

Given the potential for a wide range of routes and impacts in the mountain passes, the Authority previously used the Quantm software system for alignment optimization and refinement. Quantm's route

alignment optimization algorithms provide the capability to analyze a vast range of alignment options in a relatively short period of time. The *Alignment Refinement/Optimization and Evaluation of the Quantm System* study, completed in April 2002, analyzed a broad range of horizontal and vertical alignment options through the San Gabriel Mountains between Sylmar and Palmdale to confirm that viable alignments were being considered, as well as to provide reasonable indications regarding construction costs and potential impacts for each alignment.

As part of this Alternatives Analysis Report, two approaches were used in the initial development of alignment alternatives: traditional engineering methods relying on experienced professional judgment applied to topography, and considering existing development, existing transportation network, environment, etc., to create conceptually engineered alignments, and Quantm.

Conceptual Engineered Alignments

Two conceptual alignment alternatives were developed in 2005 for the Sylmar to Palmdale subsection based on design criteria current at that time and topography of limited accuracy that, due to the rugged mountainous terrain, differed from the actual elevations from a few feet to as much as 300 feet. The two alignments were referred to as the "SR 14 Alignment" and the "Soledad Canyon Alignment." They served as the starting point in the development of additional alignments as part of the Alternatives Analysis process for this subsection. The alignments have been modified in consideration of potential environmental issues, right-of-way, best-fit configurations, and current design criteria. From the broad range of potential alignments, five potentially feasible and representative alignment alternatives, and three sub-alternative alignments through the city of Santa Clarita, were identified. The five alignment alternatives and three sub-alternatives are briefly described below and shown in Figure 3.3-12.

ENGINEERED ALTERNATIVES

- SR 14 – The conceptual SR 14 alignment was modified to reflect more accurate topography, updated HST design criteria, and consideration of potential environmental issues, right-of-way, fit, and length of tunnels.
- Soledad Canyon – The 2005 conceptual Soledad Canyon alignment was also modified to reflect more accurate topography, updated HST design criteria, and consideration of potential environmental issues, right-of-way, fit, and length of tunnels.
- Hybrid – The Hybrid Alignment was developed using portions of the SR 14 Alignment and portions of the Soledad Canyon Alignment in an attempt to merge better elements of both. The Hybrid Alignment was then adjusted in consideration of potential environmental issues, right-of-way, fit, current design criteria, and length of tunnels.
- SR 14 Closer – This revised SR 14 Alternative moves north and closer to the SR 14 Highway through the Acton area (just south of the Palmdale curve) to reduce the impact to downtown Acton. This modification reduces the radius of the Palmdale curve and thus reduces the design speed at that location.
- North of SR 14 – This revised SR 14 Alternative moves north of SR 14 through the Agua Dulce area to reduce alignment length and journey time and to further reduce the impact on Acton. This modification has the consequence of shifting the proposed Palmdale HST Station west or north of the

existing Palmdale Metrolink Station. This new alignment departs from the SR 14 Alternative just east of Santa Clarita and curves north to reach the north side of SR 14.

ENGINEERED SUB-ALTERNATIVES

The alternatives described above all used a 220 mph exceptional curve (radius 20,500') between Sylmar and Via Princessa.

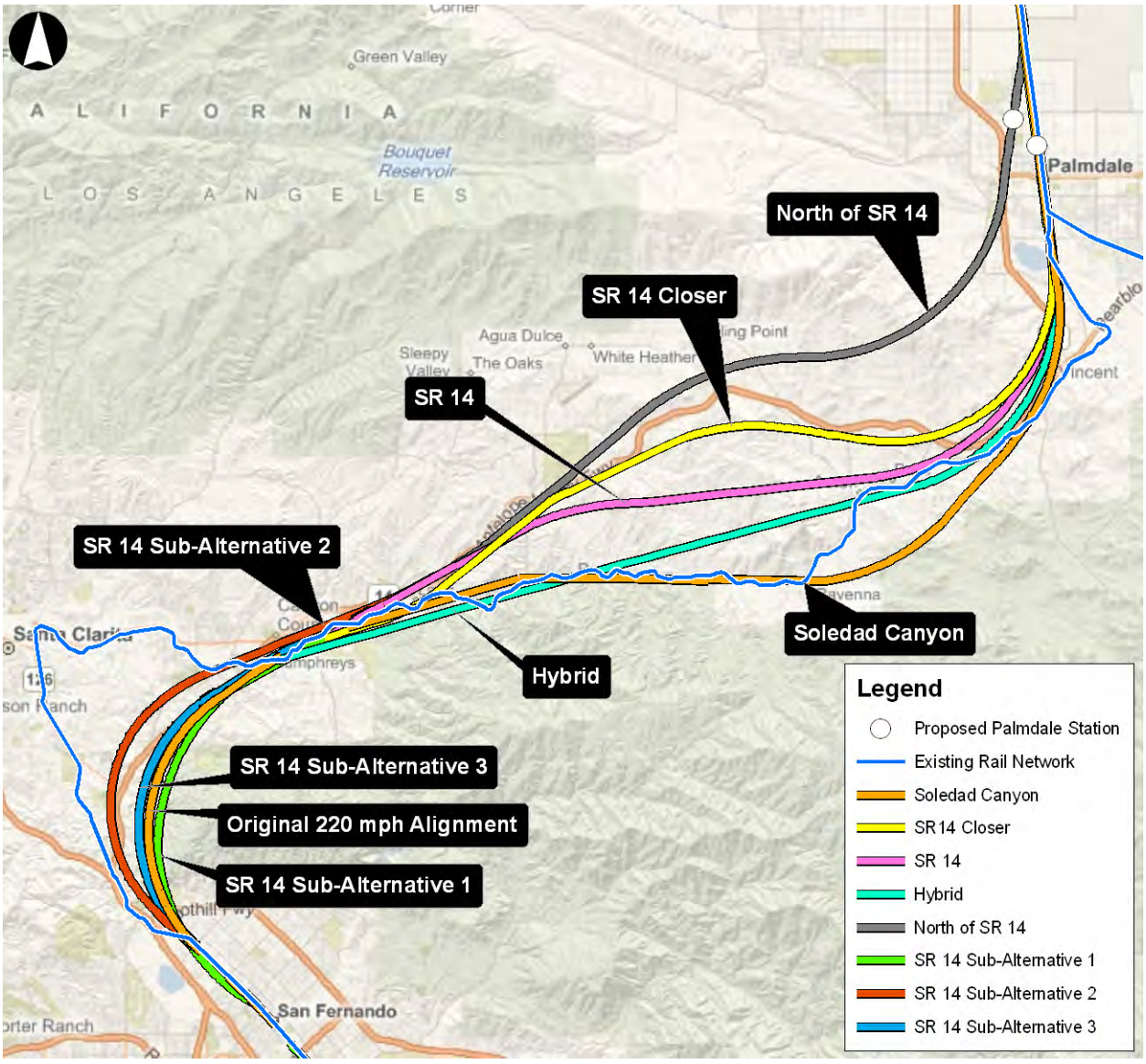
Three sub-alternative alignments were investigated for this section between Sylmar and the City of Santa Clarita. SR 14 Sub-Alternative 1 attempted to increase the design speed of the curve just north of Sylmar from 220 mph to 250 mph (250 mph being the desired maximum alignment design speed). SR 14 Sub-Alternative 2 attempted to avoid highway SR 14 and provide a better Santa Clarita station location, even if this meant reducing speed.

- SR 14 Sub-Alternative 1 – A larger radius curve just north of the Sylmar area was investigated to see if the design HST speed could be increased to the preferred 250 mph. To do this the curve stretches farther south into Sylmar.
- SR 14 Sub-Alternative 2 – A curve farther northwest of the original SR 14 alignment was investigated to see if potential impacts with an alignment on the north side of SR 14 were less severe than on the south side, and to give the possibility of a better location for a Santa Clarita station. This alignment requires a tighter radius to the curve, reducing the design speed below 220 mph. This alignment then continues past the curve slightly north of the original alignment and crosses the Santa Clara River.

The 220 mph alignment passes through the Santa Susana fault just north of Sylmar and to address seismic design requirements, has to remain at grade whilst crossing this fault. This requirement precludes the use of a tunnel alignment in this location and as a result introduces significant impacts to residential and commercial property in the Sylmar area. SR14 Sub-Alternative 3 therefore developed and improved the northwest alignment of Sub-Alternate 2 to minimize the impact on residential property in the Sylmar area.

- SR14 Sub-Alternative 3 – A smaller radius curve just north of Sylmar was combined with a more northerly alignment (north of SR14) through Santa Clarita to shift the alignment west. In Sylmar the alignment moves into an overhead power cable easement and away from the residential areas. The speed on this alignment is limited to 215 mph near Sylmar.

Figure 3.3-12 Sylmar to Palmdale Alternative Alignments



The engineered alternatives described above, along with the known constraints and design criteria used to develop them, were used as a basis for a Quantm analysis described below. The results provided by the Quantm analysis were instrumental in arriving at a range of optimized alignment alternatives for initial evaluation.

Quantm Analysis

Given the rugged mountain terrain and the potential for varying route lengths, significant impacts, and differing costs within the Sylmar to Palmdale subsection, the Authority concluded that performing a Quantm analysis would be of value. Quantm analysis added greater rigor and consistency in considering

reasonable and practical options within the Sylmar to Palmdale subsection and further clarified and strengthened the technical basis for the alignment selection and elimination process. The Quantm system examines of a wide range of horizontal and vertical alignment options in an iterative manner intended to optimize trade-offs between operating characteristics, potential impacts and costs. The analysis helped evaluate the conceptual engineering alignments, develop variations of these alignments, and consider completely new alignments.

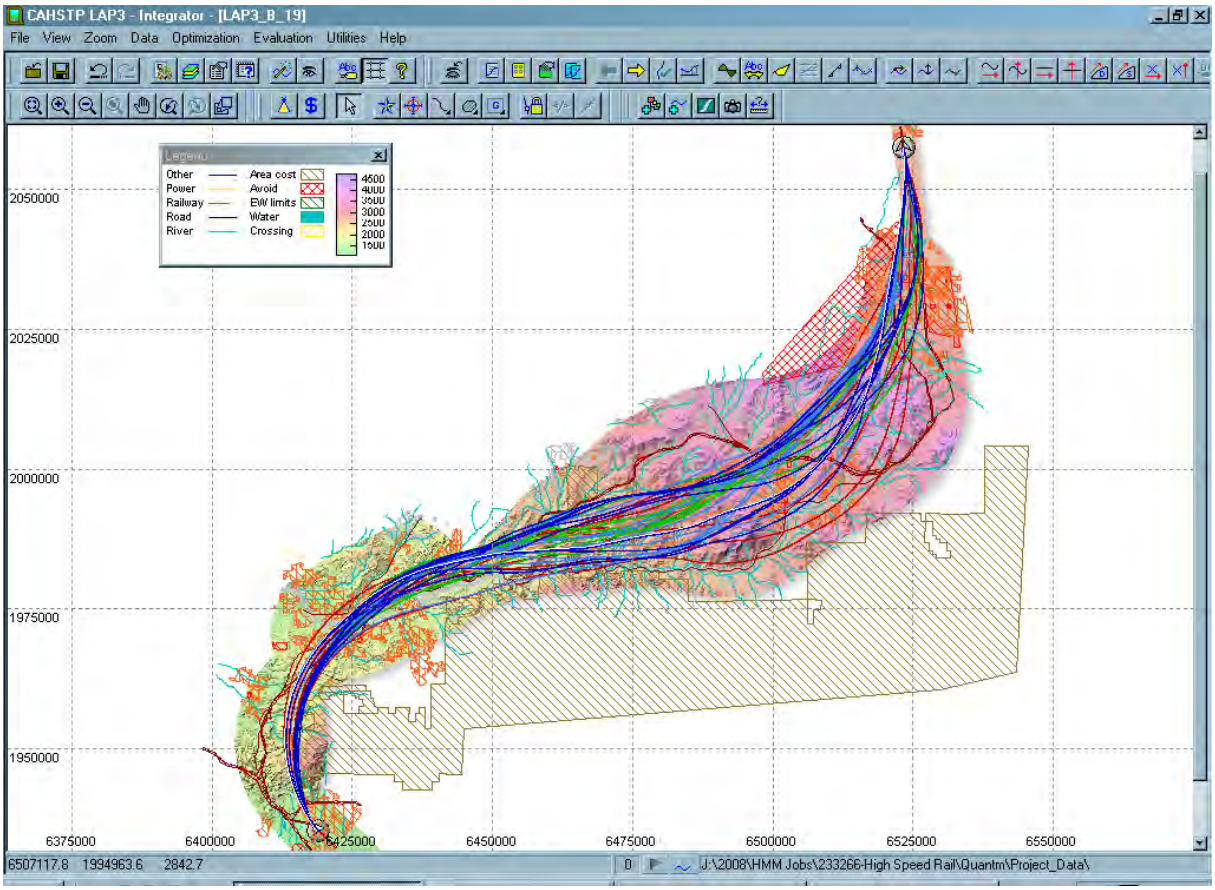
The Quantm analysis also served as a tool to investigate the potential benefits and impacts of varying the design criteria in this sub-section. In particular, any benefits of using slower-speed design criteria were investigated in an expeditious manner using the Quantm system. The results showed that slower speed alignments provided no discernible reduction in impacts.

The Quantm analysis was performed for the Sylmar to Palmdale subsection between July 2009 and October 2009 using the following input parameters:

- Terrain model information used in the preparation of the engineered alternatives
- Cut and fill parameters
- Seismic faults
- Current horizontal and vertical geometric design criteria
- Cost values for items such as cut, fill, bridges, tunnels, portals, etc.
- Crossing constraints
- Special treatment zones (avoidance areas such as downtown Acton, attraction areas such as east of Lake Palmdale area in order to avoid the lake, at-grade areas such as faults)
- Environmental constraints (i.e. endangered species, streams, rivers, etc.)

The Quantm system generated several promising alignments. With the information provided by the Quantm analysis, a more detailed engineering and environmental investigation was performed for the Quantm-generated alignments. Figure 3.3-13 is an example of the results produced by Quantm.

Figure 3.3-13 Example of Quantm Results



The 50 optimized alignments resulting from the Quantm analysis were screened and evaluated by the study team for viability based on the following criteria:

- Adherence to current design criteria
- Route length
- Travel time
- Impacts to developed areas
- Impacts to known avoidance areas
- Impacts to environmentally sensitive areas
- Comparative cost
- Overall alignment conformance for placement of HST stations

Quantm alignments that did not fully meet the gradient criteria, having sustained average grades exceeding the 2.5% maximum, were also examined to see if they had fewer impacts or offered other

advantages. There was only minimal effect on the generated Quantm alignment profiles for both 220 mph and 250 mph alignments when the maximum allowable gradient was increased from 2.5% to 3.5%. With this relaxation, the steepest gradient generated by Quantm fell within a range of 2.5% to 2.6%. The resulting alignments were not materially different from those conforming to the criteria, except for minor reductions in tunnel and viaduct heights and therefore confirmed that the optimum limiting gradient was 2.5%.

Four Quantm alignments best met the above criteria. These are described below and shown in Figure 3.3-14. Although three horizontal curves did not meet design requirements for 250 mph in Alternatives 1, 2 and 3, the study team concluded that relatively simple manual adjustments could be performed to help the alignment conform to the 250 mph design criteria while still maintaining the overall integrity of the alignment. The remaining exception to the 250 mph design criteria for each of the these alignments is the curve coming out of Sylmar, which was modified to meet the 220 mph exceptional design criteria.

QUANTM ALTERNATIVES

Quantm Soledad Canyon – This alignment is generally similar to the engineered Soledad Canyon alignment. Overall, it has very low impacts to developed areas. Although greater in overall length, it has one of the lowest costs.

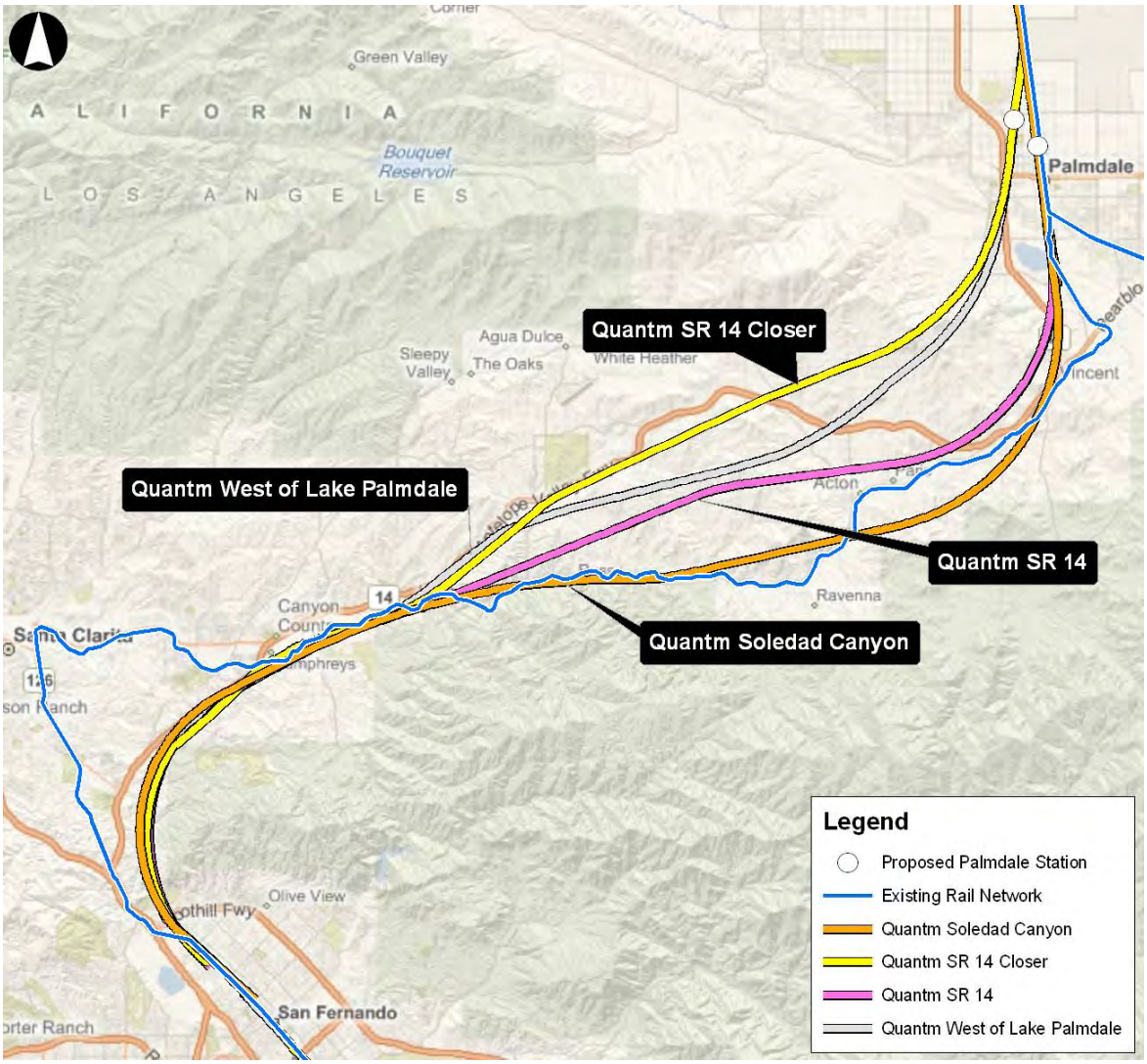
Quantm SR 14 Closer – Shares a common alignment with the engineered SR 14 Alternative between Sand Canyon and Acton but then passes west of Lake Palmdale. Comparatively, it has low impacts to developed areas. It is shorter overall and relatively lower cost.

Quantm SR 14 – This alignment is routed just east of Lake Palmdale. Similar to the engineered SR 14 alignment, this Quantm SR 14 alignment misses the Acton downtown area traversing farther north. Overall, it is a relatively straight/smooth alignment and has one of the lowest costs.

Quantm West of Lake Palmdale – It meets the 250 mph exceptional design criteria for horizontal curvature for the entire length of the alignment, except for the first curve coming out of Sylmar. This alignment is just west of Lake Palmdale. Comparatively, it has one the shortest total lengths of the Quantm-derived alignments. Overall, it is a relatively straight/smooth alignment and has one of the lowest costs.

These four Quantm alignments were then considered in conjunction with the five engineered alignments and sub-alternatives to identify superior alignments.

Figure 3.3-14 Final Quantm Alignments

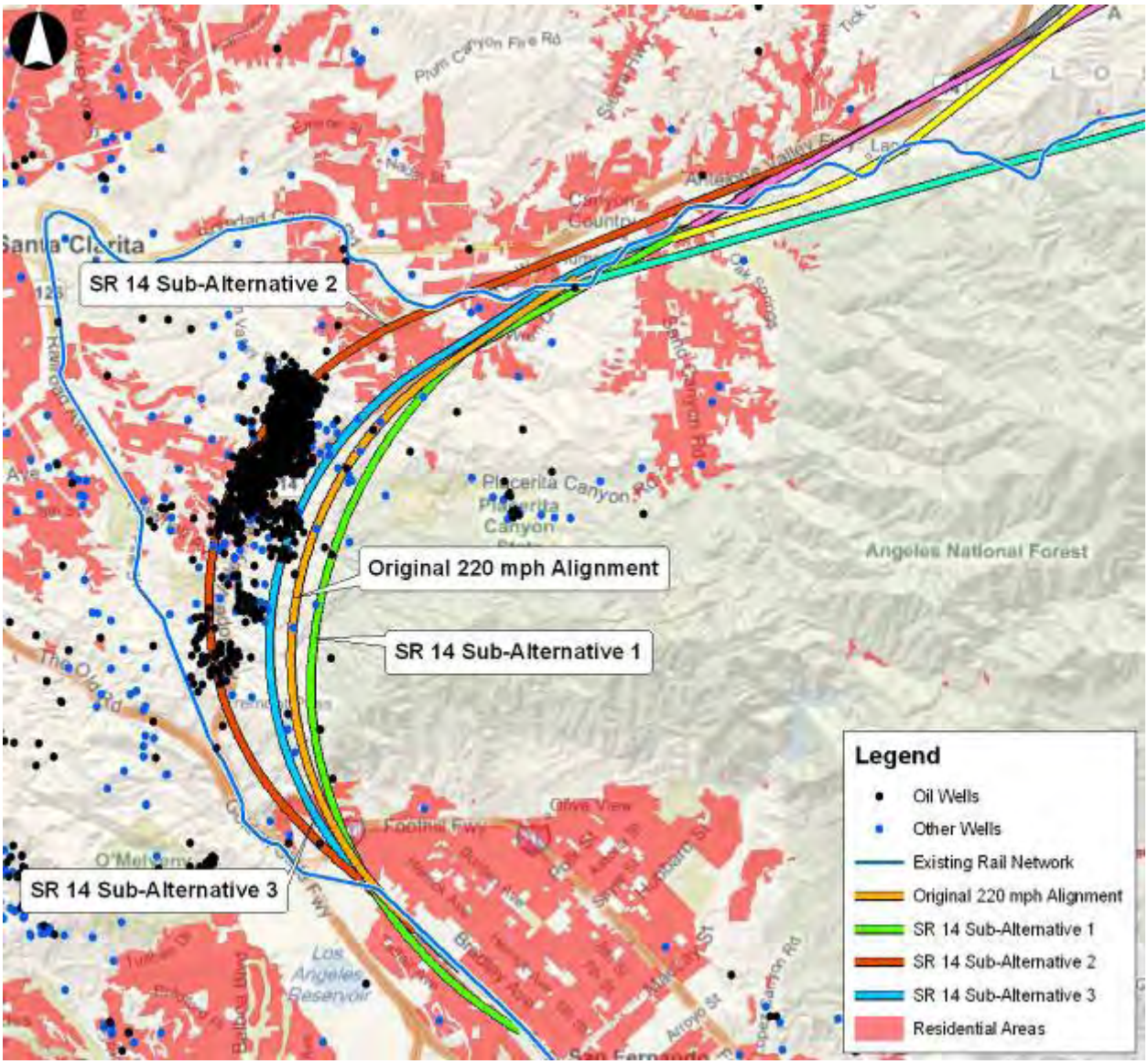


Initial Review of Alignment Alternatives

Sylmar to Sand Canyon

All the named engineered and Quantm alignments used a 220 mph, 20,500' radius, exceptional curve between Sylmar and Via Princessa, and followed a similar line up to Sand Canyon. As described above in the development of alternatives, for this section of the route three additional sub-alternatives were developed to explore the possibility of achieving a higher civil design speed, and the benefits of allowing a lower speed. These sub-alternatives are shown in Figure 3.3-15.

Figure 3.3-15 Sylmar to Sand Canyon Alignments



For this section of the route the 220 mph alignment is compared with the three sub-alternative engineered alignments:

- Original 220 mph alignment – this alignment crosses most of the Santa Susana fault zone at grade, but the tunnel portal needs to be within the fault zone. The above ground alignment required to cross the Santa Susana fault at grade requires displacement of a large number of homes in Sylmar. This option is not carried forward because of the severe impact on residential areas and because the tunnel portal is within the fault zone.

- SR 14 Sub-Alternative 1 – The larger radius curve needed to take the design HST speed up to the preferred 250 mph alignment design standards stretches farther south into Sylmar where it affects significantly more residential areas. Since there is no journey time benefit to outweigh these impacts, this option is not carried forward.
- SR 14 Sub-Alternative 2 – The alternative running on the north side of the SR 14 requires a tighter radius to the curve, reducing the design speed below 220 mph and so increasing journey time. This alignment passes through many more oil wells than the original alignment, and it affects significantly more residential areas in Santa Clarita. This option infringes more into the Santa Clara River valley and would require an elevated structure approximately 5 miles long, compared to a structure approximately 1.6 miles long for the original alignment. Environmental issues are increased due to additional impacts created by this alternate alignment. This option is not carried forward because of the increased journey time, greater environmental impacts to the Santa Clara River, more visual impacts of the extended viaduct and additional displacements in residential areas in Santa Clarita.
- SR14 Sub-Alternative 3 – Using a design speed of 215 mph with a slightly tighter radius just north of Sylmar and a revised alignment just north of the SR14 through Santa Clarita, the alignment is shifted north-west along this length. This westward shift places the alignment west of the Whitney fault, is closer to oil wells in this area, and is in the power line easement, requiring diversion of the power lines. It has considerably less impact on the residential property in Sylmar. Line speed and journey time are not significantly affected and the alignment is in tunnel when crossing the SR 14 and the residential areas in Santa Clarita. It is carried forward because it reduces impact on residential areas and has the ability to cross the Santa Susana fault zone at-grade.

Sand Canyon to Palmdale

Beyond Sand Canyon a range of alignments were considered that diverge and take different routes to Palmdale. In general, the Quantm analysis provided additional alignments for evaluation. Comparative Quantm-generated path, cost, and length for the Quantm alignments and the five engineered alignments were used for comparison of all alignments in this section.

Overall, the geographic dispersion of alignments from the Quantm process results was very similar to the area covered by the conceptual engineered alignments.

Some alignments were identified as clearly having no advantages in satisfying HST design objectives while having greater impacts in terms of the measures listed in Section 2 to evaluate and compare the project alternatives. Some alignments were very similar to each other but one had greater impacts than the other in terms of the evaluation measures. The following are descriptions of these alignments, including basis for not studying them further.

The North of SR 14 alignment is the only alignment that encroaches into Vasquez Rocks Natural Area Park (a Los Angeles County park that is on the National Register of Historic Places) for approximately 1.3 miles. Although it has the second shortest route length, it also has the longest continuous tunnel at 11.5 miles, and has the most total length of tunnel making it the most expensive. Therefore, the North of SR 14 alternative was screened out from further consideration.

The Hybrid alignment has the second most significant impact to the Santa Clara River by crossing the river via elevated structures for over 4 miles, and also passes close to the Acton town center. At-grade

and viaduct portions of the alignment cross the second greatest length (approximately 8 miles) of liquefaction hazard zones. The Hybrid alignment also has the second highest cost. For these reasons the Hybrid alternative was screened out from further consideration.

The Quantm SR 14 Closer and the Quantm W. of Lake Palmdale alignments are similar over much of their length. With more tunnel length, and a slightly longer overall length, both resulting in a higher cost, as well as having a greater impact upon the Acton area, the Quantm W. of Lake Palmdale alternative was screened out from further consideration.

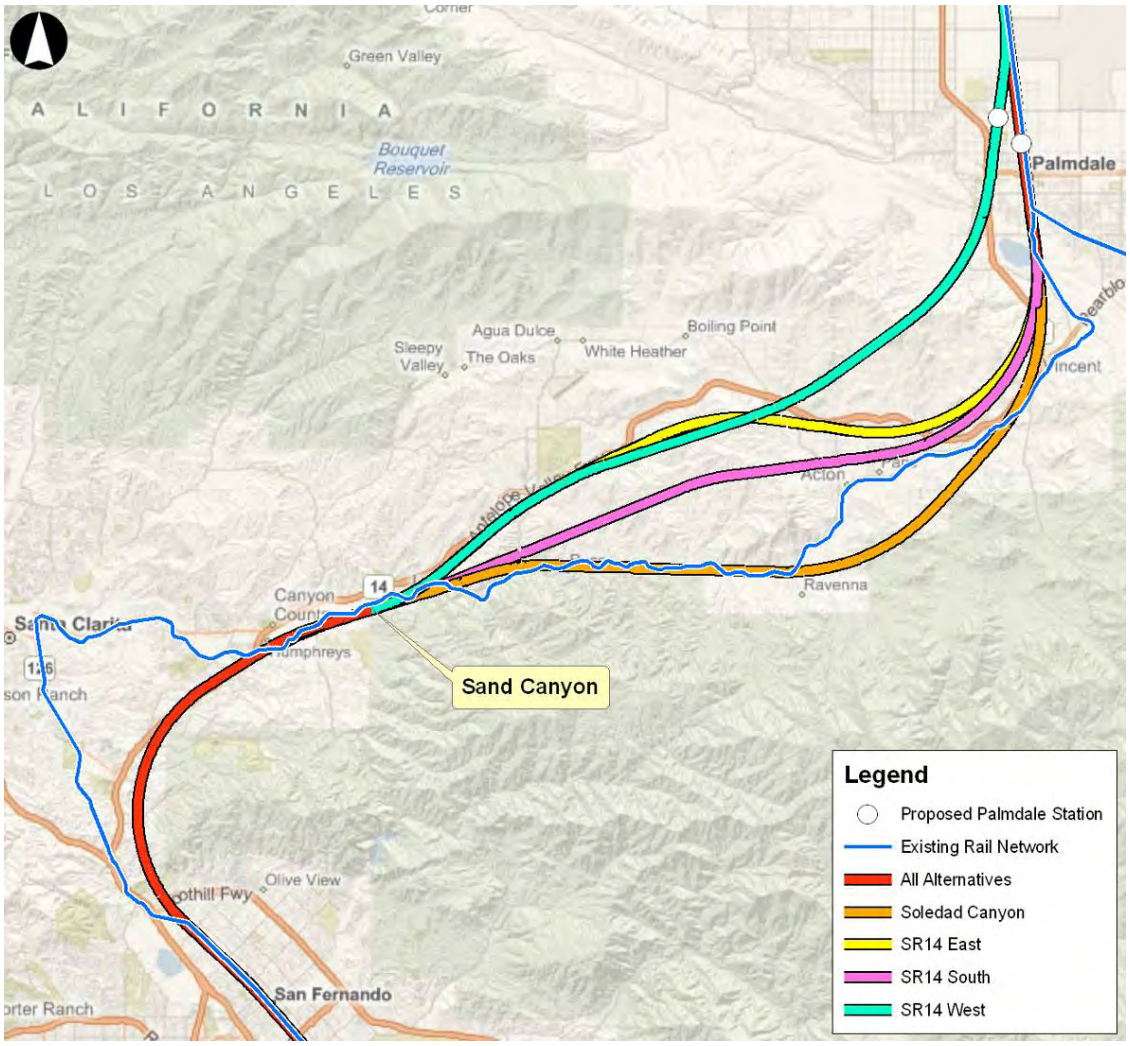
The SR 14 alignment and Quantm SR 14 alignments are similar, with both having long lengths of tunnel and high construction costs. The SR 14 alignment has a more severe impact upon the town of Acton. Therefore, the SR 14 alternative was screened out from further consideration.

The two Soledad Canyon alignment alternatives are similar in intent, largely following the line of the canyon where alignment constraints permit. Both would have major impacts, both environmentally and on existing infrastructure and settlements in the canyon, including major slope work, but these alignments have the shortest length of tunnel and so the lowest cost. By taking a slightly more direct route, the Quantm Soledad Canyon alternative adds extra tunnel and cost, and also has a more adverse impact upon Acton, compared with the engineered Soledad Canyon alignment. For this reason, the Quantm Soledad Canyon alternative was screened out from further consideration.

This preliminary evaluation resulted in the following alignment alternatives between Sylmar and Palmdale being carried forward for further analysis in Section 4. In addition, to simplify the discussion, the surviving alternatives were given new descriptive names:

Alternative Carried Forward	New Descriptive name
Soledad Canyon	Soledad Canyon
SR 14 Closer	SR 14 East
Quantm SR 14	SR 14 South
Quantm SR 14 Closer	SR 14 West

Figure 3.3-16 Sylmar to Palmdale Alignment Alternatives



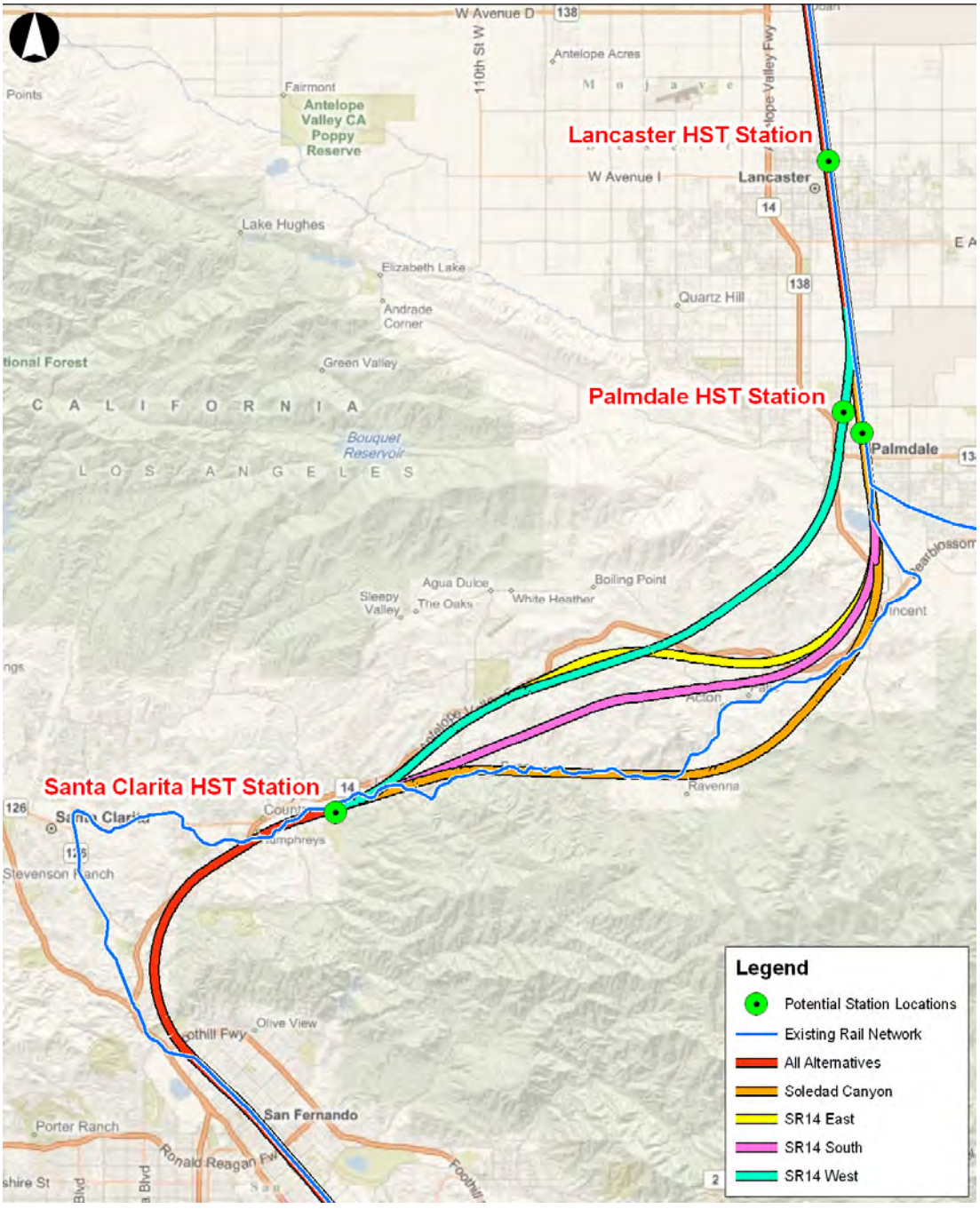
3.3.11 Sylmar to Palmdale - Station Alternatives

Identification of Station Alternatives

The program EIR/EIS identified several areas for potential HST station locations. These include the areas of Santa Clarita, Palmdale, and Lancaster. The Authority and FRA identified the Palmdale Transit Center as the preferred HST station location. Although the Final Program EIR/EIS dismissed a HST station in the Santa Clarita area, a station in this area was given further consideration at the request of the City of Santa Clarita. HST station options in Lancaster were also initially considered due to comments received as part of outreach activity for the Bakersfield to Palmdale HST section.

Below in Figure 3.3-17, the approximate locations of four potential stations are shown, followed by a brief description of each.

Figure 3.3-17 Sylmar to Palmdale Potential HST Station Locations



- Santa Clarita HST Station – The Santa Clarita Station option studied the possibility of a HST station in the city of Santa Clarita. A potential station location was identified between the Via Princessa and the Lang areas along the alignments that could meet station design requirements.
- Palmdale HST Station – Two station locations were studied for the possible alignments through Palmdale. One location would place the station between Avenue Q and Technology Drive adjacent to the existing Metrolink station and partially within existing UPRR and Metrolink right-of-way. The second location would locate the HST station on the west side of Palmdale, west of Sierra Highway, with the south end of the station located just north of E. Avenue P.
- Lancaster HST Station – The Lancaster Station option studied was proximate to the existing Metrolink station to provide intermodal connection to existing commuter rail service and local bus services.

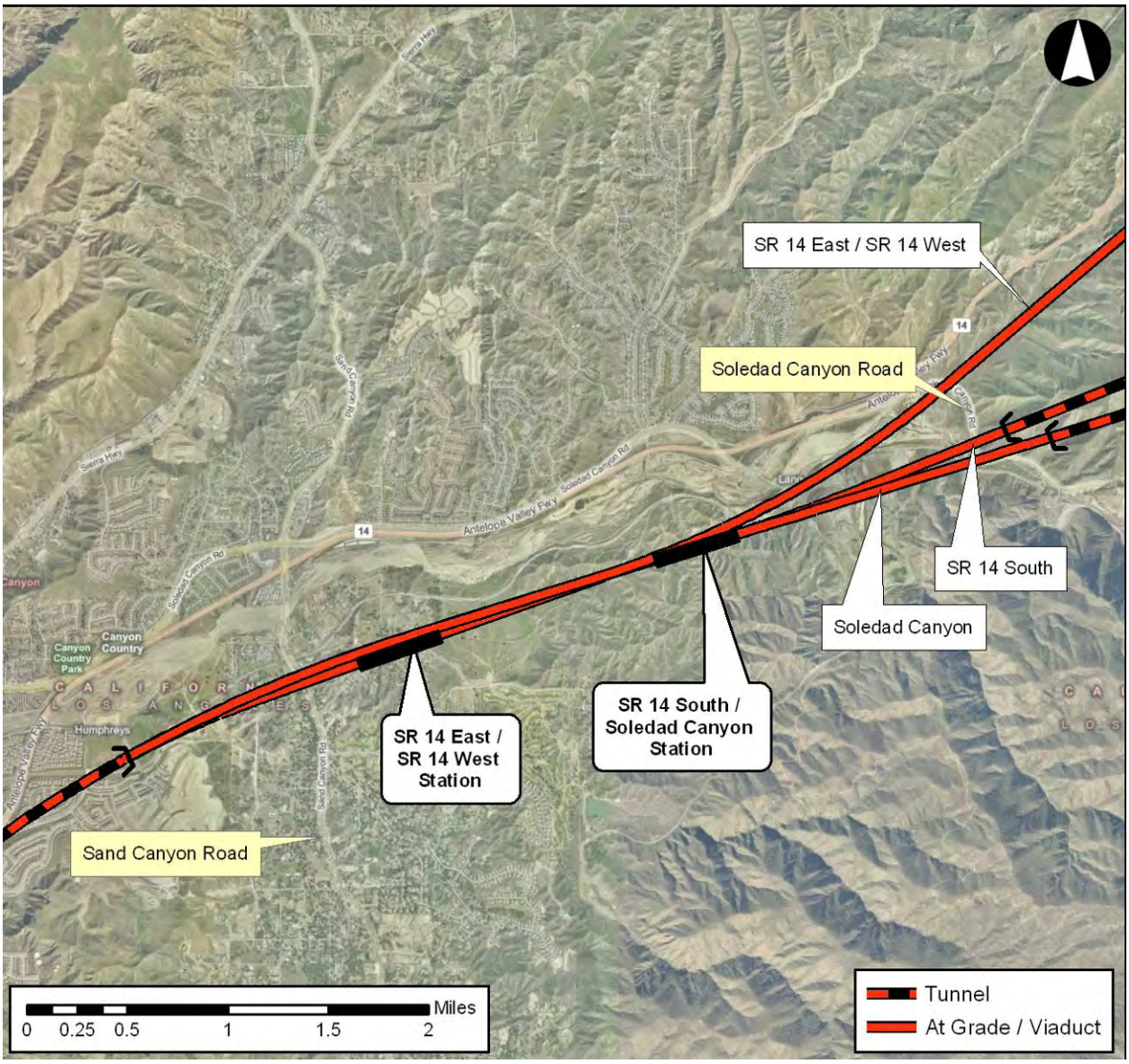
Initial Review of Station Alternatives

Certain HST station locations offered advantages over others. Qualitative and quantitative engineering comparisons identified several HST station location options as undesirable and their analysis was concluded.

Santa Clarita HST Station Alternative - A station at Santa Clarita would serve a population of up to 275,000, including the adjoining unincorporated areas. However, the only location where the alignments could accommodate a length of straight relatively level track suitable for a station is about seven miles east of the center of Santa Clarita, on the edge of the developed area northeast of Sand Canyon Road and south of SR 14.

Due to the various alignments alternatives, only two potentially-feasible locations are identified for a Santa Clarita station, as shown on Figure 3.3-18. Due to the different horizontal and vertical alignments in this location, there are three slightly different station configurations – one for both the SR 14 East and SR 14 West alignments, (which are common at this point), and two others – one for the SR 14 South alignment and one for the Soledad Canyon alignment.

Figure 3.3-18 Santa Clarita HST Station Options



Although the potential Santa Clarita station locations are very similar for all alignment alternatives, there are some differences between them:

- Locating a station on the SR 14 East and SR 14 West alignments would require some realignment to provide sufficient tangent length for a station layout. This alignment would have a greater impact than the no station alignment on residential property along Oak Spring Canyon Road. The vertical gradients can accommodate the station location, and also the universal crossovers required at the north end of the proposed station, though the resulting profile would conflict with Sand Canyon Road, which would have to be raised or diverted to avoid an at-grade crossing. However the length

of tangent track is insufficient and vertical gradient is not compliant for the crossovers required at the south end of the station, so a Santa Clarita station on the SR 14 East and SR 14 West alignments does not fully meet the HST station design criteria.

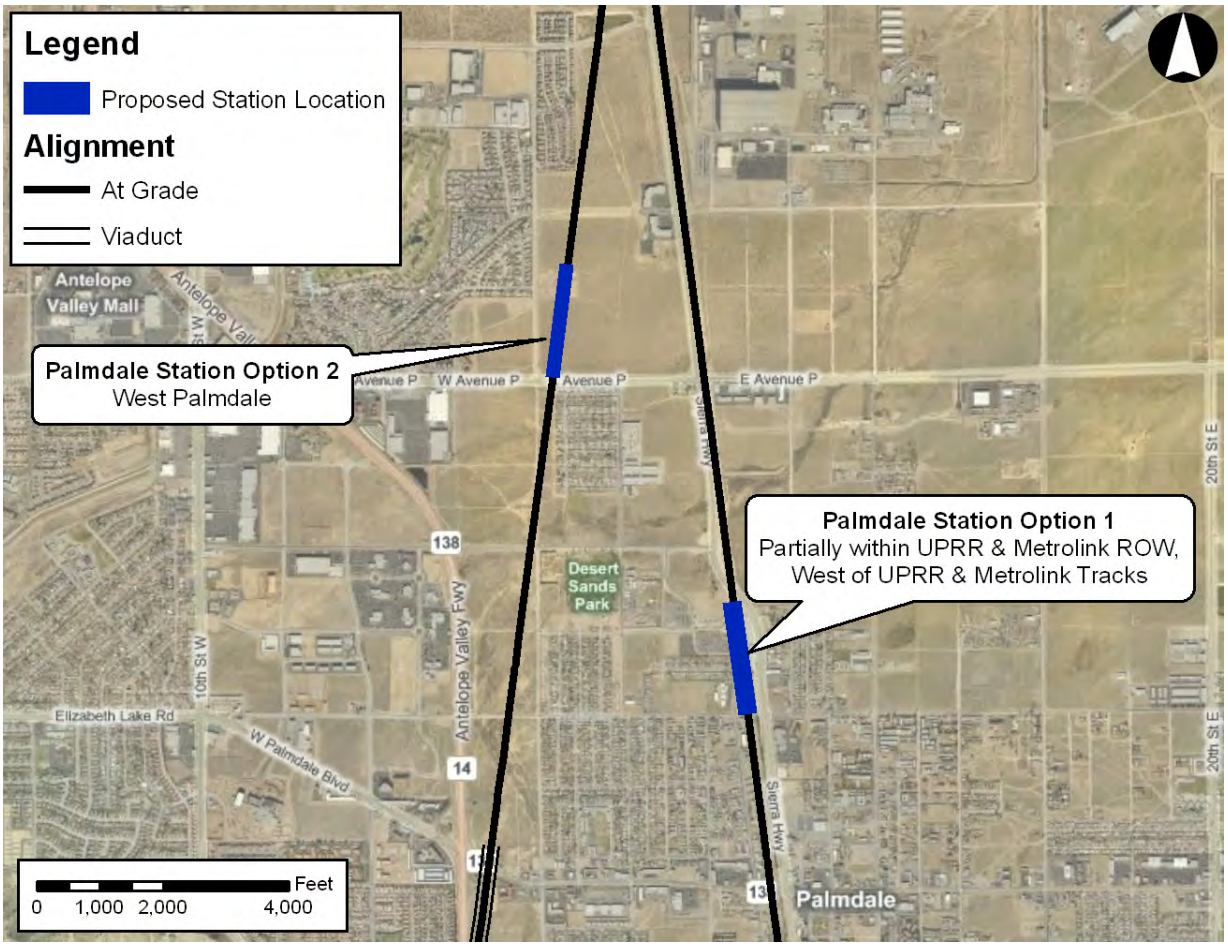
- Locating a station on the SR 14 South alignment would require horizontal realignment to provide sufficient tangent length for a station layout. The vertical profile required to accommodate a station conflicts with Lang Station Road and Soledad Canyon Road, so both these roads would have to be raised or diverted to avoid at-grade crossings. This revised vertical profile also intercepts two stream crossings that would have to be diverted.
- A station on the Soledad Canyon alignment would not require significant horizontal realignment to provide sufficient tangent length for a station layout. The vertical profile required to accommodate a station conflicts with Lang Station Road and Soledad Canyon Road, so both these roads would have to be raised or diverted to avoid at-grade crossings. This revised vertical profile also intercepts a stream crossing that would have to be diverted. Realigning to accommodate a station requires relocating the tunnel portal east of Lang, increasing tunnel length by about 1300 feet.

The potential Santa Clarita station location is in a predominantly residential area of single-family homes on large lots, with some businesses and churches. Displacements would be necessary in order to accommodate a station and a road connection from the station to the SR 14 freeway, possibly via the existing Sand Canyon Road suitably improved.

Though the potential Santa Clarita station location is close to the Metrolink alignment, there is no existing Metrolink station nearby. However, there is a planned residential and commercial development with a new Metrolink station about half a mile to the southwest near Lost Canyon Road, which could be linked to a HST station. Conversely, a new Metrolink station accompanied by the improved Metrolink service that could result from eliminating many of the existing at-grade crossings on the Metrolink line through the San Fernando Valley could meet much of the need for a HST station in Santa Clarita.

In summary, due to the mountainous terrain and the need to pass the City of Santa Clarita along its south-eastern side to minimize impacts to developed areas, the potential location for a HST station would be in a predominantly residential area remote from the center of Santa Clarita, with poor connections to existing or future transportation facilities. The design criteria requiring an HST station to be located in a 6,000 foot long straight section at a maximum gradient of 0.25% with crossovers at both ends can be met fully only for the SR 14 South and Soledad Canyon alignments. Even on the alignments where a station can meet design criteria, the adjustments to the alignments to accommodate a station increase impacts to existing roads and watercourses and, in the case of the Soledad Canyon alignment, increases tunnel length. A station at Santa Clarita would require residential displacements and have limited TOD opportunity. Based on all these considerations, a Santa Clarita HST station alternative fails to meet purpose and need, is impracticable and has been dropped from further consideration. This finding is consistent with the Program EIR/EIS.

Figure 3.3-19 Palmdale HST Station Options



Palmdale HST Station Alternative – Palmdale is expected to grow as a hub in the Antelope Valley. Growth patterns in the Antelope Valley suggest that a station site closer to the south end of the valley as compared to one further north would provide access that is more convenient to a greater number or riders. Access is facilitated by major highways and arterials such as SR 14, the Sierra Highway, Rancho Vista Boulevard and SR 138. Proximity to the existing Palmdale Transit Center would enhance multi-modal opportunities for regional travel and HST access/proximity to the Palmdale regional airport is also viewed as important. The Palmdale station location options are described in section 4 of the report.

Lancaster HST Station Alternative – The Program EIR/EIS considered a potential HST station location near the existing Lancaster Metrolink station. The Authority and FRA concluded that this location does not meet program objectives because it would provide poor connectivity and ridership potential due to its distance from the Palmdale Airport, local and regional bus service, and the Palmdale Transit Center. Lancaster was again considered as a potential station location in developing alternatives for this report, and the findings confirmed the conclusion of the program EIR/EIS.

The communities of Palmdale and Lancaster have agreed to work collaboratively for an appropriate station location in Antelope Valley and regional leaders, including the City of Lancaster, determined that Palmdale was most appropriate location given the significant investment in transportation infrastructure already made by Palmdale.

3.4 Agency Coordination and Public Outreach

The Authority has built and maintained relationships with city staff and key stakeholders in each of the cities along the Palmdale to Los Angeles section. Specific city opinions and/or positions with regard to general concerns, alignment alternatives and station options include:

- City of Glendale
  The city council is generally supportive of high-speed rail but has general concerns about intermodal connectivity especially with regard to the Burbank Airport and duplication of several systems with the county of Los Angeles including Metrolink, Amtrak and the HST. Other concerns include short- and long-term impacts with regard to construction and project completion, right-of-way acquisition, grade separations, cross section of San Fernando Road, aesthetic concerns, and station location.
- City of Burbank
  The city has concerns about station location and community disruption especially with regard to their downtown hub currently surrounding their Metrolink station and right-of-way encroachment into neighborhoods. The City wants cut-through traffic between SR 134 and I-5 that is related to any potential HST station minimized. The City prefers that the Metrolink station not be moved to co-locate with high-speed rail. Council members, city staff, and representatives of the Burbank Airport encouraged the study of an airport station. The project team embarked on a station study of 14 possible station locations and has included a station option near the airport. The city prefers this location.

Burbank/Glendale/Los Angeles Rail Transit Project

The Burbank / Glendale / Los Angeles Rail Transit Project is included in the unfunded section of Metro's Long Range Transportation Plan. The Authority will work with Metro and the cities along the route to study alternative transit solutions and routes that might connect Los Angeles Union Station, Glendale and Burbank. Alternatives would likely include expanded rail service along the existing Metrolink railroad line, light rail in-street alignments, rubber tire in-street alignments, or a combination of these, with a goal of identifying feasible transit concepts.

The Glendale-Burbank Light Rail was discussed with the City of Glendale staff on December 21, 2009, which recognized it as a nineteen year old, unfunded project. However, at the City Council workshop on February 9, 2010, Councilman Ara Najarian suggested that any high-speed rail proposals should not preclude a Glendale-Burbank Light Rail project, possibly using diesel multiple units.

When asked about the Glendale-Burbank Light Rail on December 22, 2009, City of Burbank staff acknowledged that it was an "old project that likely will not happen and that it would be superfluous to have it running next to current Metrolink service".

- City of San Fernando
  Both the city council and staff are very supportive of high-speed rail and are working to identify ways to ensure the station is located within the city. City staff stated that a San Fernando station would be very convenient to local freeways
- City of Los Angeles (Downtown and San Fernando Valley)
  City staff is supportive of high-speed rail, but has concerns about the train running through dense urban communities surrounding SR 134; the latest alignment alternatives showing a tunnel through these areas was very well received. With regard to the San Fernando Valley, Councilman Alarcon and the north valley planners are very supportive of high-speed rail and are promoting a station located in the City of Los Angeles at the North end of the valley that would offer good freeway access. The valley planners and the Mayor's office are supportive of the Pacoima station option.
- City of Santa Clarita
  The city has historically supported the concept of a high-speed rail system, however they are concerned that the Authority is not giving the same consideration to a Santa Clarita Valley station stop as it is to a San Fernando Valley station stop. The city is also concerned with visual and noise impacts to their communities. The Authority's project team has met with the city numerous times and is working with the city to propose improvements to Metrolink to help with connectivity to the HST and LAUS in the absence of a station location.
- City of Palmdale
  Mayor Ledford and the city council and staff are very supportive of the project.

Corridor Cities Briefings

Corridor city staff briefings and elected official workshops were held in each city within the segment to inform them of the status of the Project EIR-EIS, its schedule, to elicit comment on each specific city's alignment alternatives and station options, and to identify community stakeholders within their jurisdiction to invite to participate in environmental review process. PowerPoint presentations and drawings were reviewed at each meeting to provide an update on the alignment alternatives and station options, and obtain feedback.

City of Los Angeles

- Los Angeles Technical Working Group — June 17, 2010; February 11, 2010; January 14, 2010

  Attendees: Irv Taylor (Metro), Donald Spivack (CRA), Arthur Henry (Metro), Maria Souza-Roundtree (City of Los Angeles), Monica Walters (City of Los Angeles), Borja Leon (City of Los Angeles), Robin Blair (Metro), Richard Stanger (LADOT), Miles Mitchell (LADOT), Sergio Valdez (LADOT), Jeff Carpenter (CRA), Darrell Maxey (SCRRA), Ann Kerman (Metro), Patricia Diefenderfer (City of Los Angeles), Claire Bowin (City of Los Angeles), Nick Maricich (City of Los Angeles)

- City of Los Angeles – Mayor's Office – Valley Area Planners — May 26, 2010; February 24, 2010; December 17, 2009; July 16, 2009; July 2, 2009

  Attendees: Mayor's Office Marcella Ayala, Senior City Planner North Valley Region Bob Duenas, Sylmar Community Planner North Valley Region Emily Yllescas, Senior City Planner Kevin Keller, Central City Community Planner Nick Maricich, CRA LA Gerald Gustuban, LA City Planning Department Jane Blumenfeld LADOT Miles Mitchell, LA City Planning Department Anita Cerna, LADOT Vicente Cordero LA City Planning Department Simon Pastucha, LA City Planning Patricia Diefenderfer, RIPG/LA City Planning Department Consultant Allyn Rifkin, Urban Design Studio Emily Gabel-Luddy, LA City Planning Department Claudia Rodriguez

Glendale

- City of Glendale – City Staff — May 3, 2010; December 21, 2009; July 6, 2009

  Attendees: City Manager James Starbird; Planning Director Hassan Haghani, Public Works Director Steve Zurn, Traffic and Transportation Administrator Jano Baghdanian, Traffic and Transportation Analyst Fred Zohrehvanb, Principal Traffic Engineer Wayne Ko, Assistant Traffic and Transportation Administrator Thomas Mitchell

- City of Glendale Council Workshop — February 9, 2010

  Attendees: Mayor Frank Quintero, Council Member John Drayman, Council Member Laura Friedman, Council Member Ara Najarian, Council Member Dave Weaver

Burbank

- City of Burbank – City Staff — May 10, 2010; March 18, 2010; January 12, 2010; December 22, 2009; May 27, 2009; February 23, 2009; June 24, 2008

  Attendees: Principal Transportation Planner David Kriske, Deputy City Planner Michael Forbes, Community Development Director Greg Herrmann, Council Member Reinke, Council Member Talamantes, Bob Hope Airport Dan Feger

- City of Burbank Council Workshop — March 2, 2010; February 25, 2010; February 2, 2010; March 13, 2007

  Attendees: Mayor Gary Bric, Vice Mayor Anja Reinke, Council Member Dave Golonski, Council Member Dr. David Gordon, Council Member Jess Talamantes

San Fernando

- City of San Fernando – City Staff — May 26, 2010; May 11, 2010; March 15, 2010; December 21, 2009; June 16, 2009; March 9, 2007

  Attendees: San Fernando Police Department Daniel Ambriz and Kevin Glasgow, Community Development Director Paul Deibel, Interim City Administrator Robert Ordelheide, Public Works Director Ron Ruiz, Redevelopment Agency Executive Director Mary Streen, Mayor Pro-Tem Mario Hernandez, Council Member Maribel De La Torre

- City of San Fernando Council Workshop — February 1, 2010; January 19, 2010

  Attendees: Mayor Steven Veres, Mayor Pro-Tem Mario F. Hernandez, Council Member Ernesto Hernandez, Council Member Brenda Esqueda, Council Member Maribel De La Torre

Santa Clarita

- City of Santa Clarita – City Staff — May 25, 2010; May 4, 2010; February 10, 2010; September 2, 2008; August 24, 2008; March 27, 2007

Attendees: Director of Public Works Robert Newman, Director and Parks Recreation and Community Services Rick Gould, Director of Administrative Services Darren Hernandez, Director of Community Development Paul Brotzman, Intergovernmental Relations Officer Michael Murphy, Acquisition Specialist Barbara Blankenship, City Traffic Engineer Andrew Yi, Senior Traffic Engineer Ian Pari, Administrative Analyst Patrick Bryant, Associate Planner Ben Jarvis, Assistant City Engineer Damon Letz, Administrative Analyst Adrian Aguilar

Palmdale

- Mayor James Ledford, City of Palmdale — September 9, 2009
- City of Palmdale – City Staff — December 16, 2009; July 9, 2009; April 4, 2007

Attendees: Assistant City Manager Laurie Lile, Director of Planning Asoka Herath, Director of Public Works Mike Mischel, Traffic/Transportation Engineer Bill Padilla, Senior Transportation Planner/GIS Coordinator Mike Behen, and Senior Civil Engineer Brian Kuhn, Planner Asoka Herath

County of Los Angeles

- Acton Town Council — May 17, 2010; February 1, 2010; May 21, 2007
- Agua Dulce Town Council — May 17, 2010; October 14, 2009

Elected Officials and Staff Briefings

Briefings were scheduled proactively and at the request of elected officials and their staff to keep them engaged and updated on the project, to listen and obtain feedback and incorporate comments into the Project Level EIR/EIS, and to identify community stakeholders within their jurisdiction to invite to participate in environmental review process. Drawings of the alignment alternatives and station options and an updated timeline were presented and reviewed at each meeting.

Los Angeles City Council

- Office of Mayor Antonio Villaraigosa — June 3, 2010
  Marcella Ayala, LA Business Team — May 20, 2010

Borja Leon, Transportation Policy Director	March 5, 2010 March 7, 2007
• Office of Councilman Richard Alarcon	June 11, 2010
Faisal Alserri, Planning Deputy	April 6, 2010
Dan Rosales, Planning Supervisor	February 2, 2010 December 8, 2009 May 20, 2009 June 11, 2007 March 7, 2007
• Office of Councilmember Tom LaBonge	July 1, 2010
Lisa Schechter, Legislative Deputy	February 2, 2009 July 28, 2008 June 10, 2008 March 19, 2008 October 29, 2007 March 5, 2007
• Office of Councilman Greig Smith	April 22, 2009
Hannah Lee, Planning and Transportation Deputy	May 2007
• Office of Councilman Tony Cardenas	May 21, 2009
Planning Deputy, Daniel Skolnick	March 7, 2007
• Former-Councilwoman Wendy Greuel	June 9, 2009
Daniel Tarica, Legislative Deputy	February 27, 2007
• Office of Councilmember Jan Perry	February 25, 2009 February 12, 2007
• Office of Councilmember Ed Reyes	April 8, 2010
Jill Sourial, Deputy	November 12, 2009 February 27, 2009 June 10, 2008 February 21, 2008 October 15, 2007 June 14, 2007 March 7, 2007
• Office of Councilmember Jose Huizar	February 23, 2009 May 9, 2008 February 8, 2007
• Office of Councilmember Eric Garcetti	May 13, 2009 February 21, 2007

Los Angeles County Supervisor Briefings

• Office of Supervisor Gloria Molina	April 26, 2010
Nicole Englund, Senior Transportation Deputy	March 25, 2009
	February 21, 2007
• Office of Supervisor Zev Yaroslavsky	June 29, 2010
Vivian Rescalvo, Transportation Deputy	June 8, 2009
• Office of Supervisor Mike Antonovich, Mike Cano,	June 7, 2010
Norm Hickling, Rosalind Wayman,	April 26, 2010
Paul Novak, Kathryn Leibrich	December 16, 2009
	October 5, 2009
	February 11, 2009
	July 17, 2008
	July 1, 2008
	June 6, 2008
	March 5, 2007

California State Assembly Briefings

• Office of Speaker of Assembly John A. Perez	April 12, 2010
Enrique Gasca, District Director	
Miguel Martinez, Chief of Staff	
• Office of Assemblyman Felipe Fuentes	January 29, 2010
Raul Bocanegra, Chief of Staff	May 6, 2009
Israel Salas, Deputy	August 7, 2009
• Office of Assemblyman Mike Feuer	May 19, 2009
Ellen Isaacs, Transportation Deputy	
• Office of Assemblyman Paul Krekorian	September 2, 2009
John Hisserich, Consultant	
• Office of Assemblyman Bob Blumenfield	September 3, 2009
Lyn Shaw, Senior Field Representative	
• Office of Assemblyman Cameron Smyth	August 4, 2009
Jarrod DeGonia, Chief of Staff	
• Office of Assemblyman Steve Knight	August 4, 2009
Larry Grooms, District Director	

- Office of Assemblyman Kevin De Leon — March 9, 2010
  Alana Yanez, Field Representative — October 14, 2009
  Steve Veres, District Director

California State Senate Briefings

- Office of Senator Alex Padilla — May 6, 2009
  July 28, 2008
- Office of Senator Carol Liu — February 24, 2010
  Tahara Goraya, Field Representative — September 18, 2009
- Office of Senator George Runner — July 30, 2009
  Lisa Moulton, District Director
  Andrew Mercy, Deputy Chief of Staff
- Office of Senator Gil Cedillo — March 8, 2010
  Arturo Chavez, District Director — September 18, 2009
  Mario Beltran, Field Representative

California Congressional Briefings

- Office of Congressman Adam Schiff — February 23, 2010
  Yvonne Hsu, Policy Deputy — August 4, 2009
- Office of Congressman Henry Waxman — September 23, 2009
  Christine Romero, Caseworker
- Office of Congressman Brad Sherman — March 15, 2010
  Michael Tou, Policy Deputy — July 29, 2009
- Office of Congressman Howard Berman — April 15, 2010
  Daniel Harsha, Transportation Deputy — September 10, 2009
- Office of Congressman Howard “Buck” McKeon — March 17, 2010
  Bob Haueter, Deputy Chief of Staff
- Office of Congresswoman Lucille Roybal-Allard — March 19, 2010
  December 17, 2010
  March 19, 2007
- Office of Congressman Xavier Becerra — April 8, 2010

Gayle Greenberg, Field/Constituent Outreach Supervisor September 15, 2009

Local, State, and Federal Agency Briefings

Briefings were scheduled to keep stakeholders engaged and updated on the project, to listen and obtain feedback, and incorporate comments into the Project Level EIR/EIS. Drawings of the alignment alternatives and station options and an updated timeline were presented and reviewed at each meeting.

United States Forest Service June 9, 2010

California State Historic Parks June 15, 2010
June 21, 2010

Caltrans, District 7

- Reza Fateh March 29, 2010

SCRRA

- Darrell Maxey, David Solow January 29, 2010

Metro/Metropolitan Transportation Authority (MTA)

- Preliminary Alternatives Analysis Report Review July 1, 2010
- Mayor's Office joint meeting July 1, 2010
- Alex Clifford and Borja Leon, Pacoima Discussion May 20, 2010
- Alex Clifford, Pacoima Discussion May 13, 2010
- Monthly Outreach Coordination May 11, 2010
- Monthly Outreach Coordination April 13, 2010
- Legislative Briefing April 8, 2010
- Pre-TWG Meeting April 6, 2010
- Monthly Outreach Coordination March 9, 2010
- Monthly Outreach Coordination February 9, 2010
- Monthly Outreach Coordination January 12, 2010
- Alignment Tour December 15, 2009
- Glendale/Burbank LRT Discussion December 9, 2009
- Valley Alignment Review December 4, 2009
- Palmdale to Sylmar Alignment Review November 30, 2009
- AA Outreach Timeline Review November 18, 2009
- Outreach Coordination Review October 30, 2009
- Outreach Coordination Review July 24, 2009
- Staff Briefing May 22, 2008
- Staff Briefing May 1, 2008

Attendees/Metro Staff: Alex Clifford, Irv Taylor, Lynda Bybee, Susan Gilmore, Ann Kerman, Walt Davis, Arthur Henry, Mike Turner, Marissa Yaeger

Los Angeles County Regional Planning

• Marshall Adams	March 18, 2010
Army Corps of Engineers	
• Veronica Chan and Phuong Trinh	March 5, 2010
• Design River Workshop	September 14, 2009
• Design River Workshop	July 28, 2009
• Presentation of Alignment	July 16, 2009
	March 25, 2008
Los Angeles County Department of Public Works	
• Steve Hennessee, Mapping and Property	May 27, 2010
• Richard Smith, Aviation Division	March 2, 1010
LOSSAN	May 26, 2010
Los Angeles Unified School District	March 11, 2010
	September 29, 2009
Acton/Agua Dulce Unified School District	June 7, 2010

Community Meetings

Community meetings were held to update stakeholders within the segment. A PowerPoint presentation was presented that included general information about the High-Speed Train including the history, funding, benefits, environmental analysis protocols, drawings of the specific alignment alternatives and station options for each city, and contact information for comments and questions.

• Atwater Street Festival	June 13, 2010
• Westchester Neighbors Association	June 7, 2010
• Association of Rural Town Councils	May 27, 2010
• Quartz Hill Town Council	May 18, 2010
• Los Angeles Neighborhood Initiative – Community Forum	May 13, 2010
	May 14, 2009
• Mid-Town North Hollywood Neighborhood Council	May 12, 2010
• Valley Industry and Commerce Association	May 11, 2010
	May 15, 2008
	May 13, 2008
	April 24, 2008
	April 9, 2007
• Highland Heritage Trust	May 11, 2010

• National Train Day	May 8, 2010
• Central City Association - Transportation & Infrastructure	May 5, 2010 June 24, 2008 April 10, 2007
• Los Angeles Neighborhood Initiative	May 5, 2010
• Lakeview Terrace Improvement Association	May 3, 2010
• National Railroad Days	May 1 and 2, 2010
• LA River Revitalization Corporation	April 27, 2010
• Fiesta Broadway	April 25, 2010
• Catellus	April 19, 2010
• Earth Day at The Promenade	April 17, 2010
• Foothill Trails District Neighborhood Council	April 15, 2010
• Sylmar Women's Club	April 14, 2010
• Pacoima Beautiful	April 6, 2010
• Rotary Club of Burbank	April 6, 2010
• Eagle Rock Neighborhood Council	April 6, 2010 August 11, 2009
• LA-San Gabriel Rivers Watershed Council	April 1, 2010
• Sun Valley Beautiful	March 31, 2010
• Natural Resources Defense Council	March 29, 2010
• North County Transportation Coalition	March 23, 2010 May 26, 2009
• Downtown LA Neighborhood Council Transportation Forum	March 15, 2010
• Urban Land Institute, 2010 Urban Marketplace	March 15, 2010
• Glendale Rotary Club	March 11, 2010
• Transit Coalition	February 23, 2010 August 25, 2009 February 27, 2007
• NASA	February 10, 2010
• Santa Clarita Valley Chamber, Transportation Committee	February 2, 2010 March 15, 2007
• Coalition for Clean Air	January 13, 2010
• Mujeres De La Tierra	January 13, 2010
• Northern Corridor Cities	January 11, 2010
• Greater Cypress Park Neighborhood Council, Land Use Committee	January 7, 2010 September 3, 2009
• Metro Gold Line Eastside Extension	November 15, 2009
• Antelope Valley Veteran's Day	November 7, 2009
• Eagle Rock Music Festival	October 3, 2009
• Mt. Washington Homeowners Association	October 14, 2009

• Atwater Village Neighborhood Council	October 14, 2009 June 12, 2008
• LA 32 Neighborhood Council	October 7, 2009
• Universal City/North Hollywood Chamber of Commerce	September 22, 2009
• Mobility 21 Transportation Summit	September 21, 2009
• Glassell Park Improvement Association Land Use Committee	September 16, 2009 April 3, 2007
• Friends of Los Angeles River (FOLAR)	September 2, 2009
• Northwest Glendale Homeowners Association	August 24, 2009
• Nisei Week Festival	August 15 and 16, 2009
• Sun Valley Neighborhood Council	August 11, 2009
• Lincoln Heights Neighborhood Council Presentation	August 6, 2009
• LA's Largest Mixer	July 23, 2009
• Healthy Air, Healthy Communities Fair	July 12, 2009
• Pershing Square Neighborhood Day	June 28, 2009
• Antelope Valley Board of Trade – Transportation Committee	May 26, 2009
• Time Warner Cable	May 26, 2009
• Los Angeles County Neighborhood Initiative	May 14, 2009
• National Train Day	May 9, 2009
• San Fernando Valley Economic Summit	May 6, 2009
• 21st Century Transportation for Los Angeles	May 1, 2009
• Burbank Chamber of Commerce	April 30, 2009 August 4, 2008
• Earth Day Farmers Market	April 22, 2009
• Reseda Neighborhood Council	October 20, 2008
• Lincoln Heights Neighborhood Council	October 2, 2008
• Advancing Women in Transportation	August 19, 2008
• Northridge West Neighborhood Council	August 12, 2008
• LA-32 Neighborhood Council	August 6, 2008
• North Hills West Neighborhood Council	July 16, 2008
• Central Hollywood Neighborhood Council	June 23, 2008
• North Valley Democratic Club	June 19, 2008
• Antelope Valley Board of Trades	April 24, 2007
• Greater Antelope Valley Economic Alliance	April 19, 2007 March 8, 2007
• Valley Industry Association of Santa Clarita	April 17, 2007
• LA Chamber of Commerce	February 21, 2007

Interested Stakeholders

Several businesses and industries have expressed interest in the segment. The team met with these stakeholders to update them on the alignment alternatives and station options. Drawings were

presented and discussed to identify concerns with regard to right-of-way issues and intermodal connections.

- The Walt Disney Company – Burbank — March 25, 2010, December 4, 2009, November 18, 2009, September 30, 2009, August 14, 2009

  Attendees: Vice President/Communications Lisa Pitney, Vice President/Counsel Deanna Detchemendy, Senior Development Manager Dan McBrearty, Director Adam Gilbert

- Burbank-Glendale-Pasadena Airport Authority — September 3, 2009

  Attendees: Executive Director Dan Feger, Director of Noise and Environment Programs Mark Hardyment, Director of Public Affairs and Communications Victor Gill

- Defense Contractors – Palmdale — January 12, 2010

Attendees: Senior Transportation Planner/GIS Coordinator Mike Behen, United States Air Force Colonel Ron Cleaves, Boeing Representative Allen Hoffman, United States Air Force Representative Tim Hughes, Assistant Planning Director Richard Kite, Assistant City Manager Laurie Lile, Director of Public Works Mike Mischel, Northrop Grumman Representative Kevin Mitchell, Northrop Grumman Representative Rhonda Nelson, and Traffic/Transportation Engineer Bill Padilla

- San Antonio Winery — July 2, 2010, March 18, 2010, January 13, 2010, December 16, 2009

- Los Angeles World Airports — March 8, 2008

State and Federal Resource Agency Meetings

LAUS to SR 134

On March 5 and 6, 2008, two Interagency meetings were held at the Wilshire Grand Hotel in Los Angeles. Both the Palmdale to Los Angeles and the Los Angeles to Anaheim teams made presentation of the project alternatives. Planning and environmental agencies were invited to attend the March 5 session at 1:30 p.m. and transportation agencies were invited to attend the March 6 session at 3:30 p.m.

The second Interagency Coordination Meeting was held at the Los Angeles County Metropolitan Transportation Authority (Metro) building on May 22, 2008. Planning and environmental resource agencies were invited in the morning and Transportation agencies in the afternoon. Presentations were given on the Anaheim to Los Angeles alternatives and station locations and the LAUS to SR 134 alternatives.

SR 134 to Palmdale

On February 22, 2010 at 10:00 a.m., a combined Interagency meeting (local planning, environmental and transportation agencies) was held at the San Fernando Pool Facility, Multipurpose Room in San Fernando. The project team presented the subsections' alignment alternatives and station options and elicited feedback and comments on alignment and station concerns.

The State and Federal Resource Agency meeting was held on February 22, 2010 from 1:30 p.m. to 3:00 p.m. at the San Fernando Regional Pool Facility, Multipurpose Room in San Fernando as well as through a webinar and conference call. The project team presented the subsections' alignment alternatives and station options to elicit feedback and comments on alignment and station concerns.

404 NEPA Integration Meeting

The initial 404 NEPA Integration coordination meeting was held on February 22, 2010 from 3:00 p.m. to 5:00 p.m. at the San Fernando Regional Pool Facility, Multipurpose Room in San Fernando as well as through a webinar and conference call. The project team hosted a discussion with the Army Corp of Engineers and the United States Environmental Protection Agency to elicit feedback and comments on alignment and station concerns.

Stakeholder Working Group Meetings

LAUS to SR 134

On May 6, 2008, a Stakeholder Working Group meeting was held in conjunction with the Los Angeles to Anaheim team at the Norwalk Sports and Arts Complex in Norwalk, California. The meeting was attended by 45 stakeholders representing elected official offices, school districts, environmental groups, safety agencies, universities, chambers, local public agencies, and other community-based and business-based organizations.

SR 134 to Sylmar

On February 8, 2010, the Sylmar to SR 134 Stakeholder Working Group meeting was held at the Buena Vista Library in Burbank. The meeting was attended by approximately 40 business and community representatives including city staff, environmental groups, Chambers of Commerce, and other community-based organizations.

On June 17, 2010, a follow up Stakeholder Working Group meeting was held at the San Fernando Regional Pool Facility, Multipurpose Room in San Fernando. The meeting was held to respond to and follow up with questions and concerns raised by attendees at the February 8, 2010 meeting. It was attended by approximately 25 business and community representatives.

Burbank

On February 24, 2010, a Burbank-only Stakeholder Working Group meeting was held at the City of Burbank Community Services Building in Burbank. It was attended by approximately 15 business and community representatives.

On June 24, 2010, a follow up Burbank-only Stakeholder Working group meeting was held at the City of Burbank Community Services Building in Burbank. The meeting was held to respond to and follow up with

questions and concerns raised by attendees at the February 24, 2010 meeting. It was attended by approximately 25 business and community representatives.

Sylmar to Palmdale

On February 16, 2010, the Sylmar to Palmdale Stakeholder Working Group meeting was held at the Santa Clarita Sports Complex in Santa Clarita. The meeting was attended by approximately 35 business and community representative including city staff, environmental groups, Chambers of Commerce, and other community-based organizations.

On June 16, 2010, a follow up Stakeholder Working Group meeting was held at the Santa Clarita Sports Complex in Santa Clarita. The meeting was held to respond to and follow up with questions and concerns raised by attendees at the February 16, 2010 meeting. It was attended by approximately 25 business and community representatives.

3.5 Alternatives Carried Forward / Not Carried Forward

3.5.1 Alternatives Not Carried Forward

As a result of the initial review, the following alternatives were not carried forward.

Los Angeles Union Station

Refer to the Los Angeles to Anaheim Alternatives Analysis Report.

LAUS to Metrolink CMF

All options carried forward.

Metrolink CMF to SR2

All options carried forward.

SR 2 to Sylmar

HST Track Location

- WSS – An alternative that would place the HST tracks on the west side of the Antelope Valley Line right-of-way with the Metrolink tracks on the east side, sharing the right-of-way.
- WSO – An alternative that would locate the HST tracks outside and to the west of the existing Antelope Valley Line right-of-way.
- ESO – An alternative that would locate the HST tracks outside and to the east of the existing right-of-way.

Design Speed

- 220 mph – A horizontal alignment alternative based on design speeds of 220 mph north of Sonora Avenue and 140mph south of it.

Station Locations

- Burbank South
- Burbank North

- Hollywood Way
- Sunland Boulevard
- Sylmar North

Sylmar to Palmdale

HST Alignments

- SR 14 – An alignment that adheres to an original intent to follow the SR 14 corridor.
- SR 14 Sub-Alternative 1 – An alignment that utilizes a larger radius curve north of Sylmar to increase HST speeds.
- SR 14 Sub-Alternative 2 – An alignment northwest of the original SR 14 alignment developed to assess the tradeoffs between reduced HST speeds and impacts on the north side of SR 14.
- The original 220 mph alignment between Sylmar and Sand Canyon (replaced by SR 14 Sub-Alternative 3)
- Hybrid - An alignment developed using portions of the SR 14 Alignment and portions of the Soledad Canyon Alignment in an attempt to merge better elements of both.
- North of SR 14 – A revised SR 14 alignment through the Agua Dulce area north of SR 14 that attempted to reduce corridor length and journey time, and reduce impact on Acton.
- Quantm Soledad Canyon – A Quantm alignment that attempts to follow Soledad Canyon.
- Quantm West of Lake Palmdale – A Quantm alignment that sustains a 250 mph speed beyond the Sylmar curve and passes just west of Lake Palmdale.

HST Station Locations

- Santa Clarita
- Lancaster

3.5.2 Alternatives Carried Forward

The following alternatives were carried forward for further design refinement and environmental evaluation.

Los Angeles Union Station

Refer to the Anaheim to Los Angeles Alternatives Analysis Report for specifics regarding LAUS Alternatives being carried forward.

LAUS to Metrolink CMF

- LAPT1 – an alignment originating from an at-grade LAUS station that would descend into a tunnel at Spring St. with a cut and cover section through LASHP, and with the tunnel extending beyond I-5.
- LAPT2 - an alignment originating from an elevated or an at-grade LAUS station that would run on viaduct over Main St. and descend between the Gold Line and Broadway into a tunnel under Elysian Park that would extend beyond I-5.

- LAPT3 – an alignment originating from an at-grade LAUS station that would descend into tunnel beside Spring St, with the tunnel extending beyond I-5.
- LAP1A - an alignment originating from an elevated or an at-grade LAUS station that would run on viaduct above the existing station approach tracks and across the Los Angeles River above the existing track bridge, and turn northward to run beside the Metrolink alignment along the east bank.
- LAP1B – an alignment originating from an elevated or an at-grade LAUS station that would run on viaduct between LAUS and the Los Angeles River, follow its west bank, and cross the river south of I-5.
- LAP1C – an alignment originating from an elevated or an at-grade LAUS station that would run on viaduct between LAUS and the Los Angeles River, cross the river between Main Street and Spring Street, and turn northward to run beside the Metrolink alignment along the east bank.

Metrolink CMF to SR 2

- Metrolink Alignment – A HST alignment that would follow the existing Metrolink corridor, either at-grade or in a partially covered trench.
- San Fernando Road Alignment – A HST alignment that would follow the west side of San Fernando Road in a partially covered trench.

SR 2 to Sylmar

HST Track Location

- Alternative ESS – The HST would be placed on the east side of the right-of-way and the Metrolink tracks shifted to the west side, sharing the existing rail right-of-way, with allowance for possible adjustments to accommodate freight customers.

Design Speed

- Hybrid – A horizontal alignment based on progressively increasing design speeds, ranging from 140 mph to 220 mph.

Vertical Alignment

- Profile A – A predominantly at-grade profile, elevated where there are at-grade crossings
- Profile B – A predominantly at-grade profile, with roads elevated, depressed or closed.
- Profile C – A predominantly at-grade profile, depressed where there are at-grade crossings

Station Locations

- Alternative BVS – Burbank Buena Vista
- Alternative BSS – Branford Street
- Alternative PWS – Pacoima Wash
- Alternative SFS – Sylmar / San Fernando

Sylmar to Palmdale

Alignments

SR 14 Sub-Alternative 3 between Sylmar and Sand Canyon, with least residential impact, is carried forward as part of the following alignments:

- Soledad Canyon – An alignment that adheres to the original intent of following the Soledad Canyon corridor and passes east of Lake Palmdale.
- SR 14 East – An alignment that stays close to the SR 14 Highway through the Acton area to reduce the impact on downtown Acton and passes east of Lake Palmdale. (Formerly SR 14 Closer)
- SR 14 South – An alignment also passing to the east of Lake Palmdale but takes a more direct route passing closer to the Acton downtown area. (Formerly Quantm SR 14)
- SR 14 West – An alignment that stays close to the SR 14 Highway through the Acton area but passes west of Lake Palmdale. (Formerly Quantm SR 14 Closer)

Station Locations

- Palmdale – Two station sites are carried forward for the different alignment alternatives in Palmdale, as discussed in section 4.

4. EVALUATION OF ALTERNATIVES

4.1 Evaluation Measures

The alignment alternatives, station locations and design options carried forward into the detailed alternatives analysis were assessed for each of the project objectives and evaluation measures. This information was then used to determine which alternatives should be carried forward into preliminary engineering design and environmental review as part of the EIR/EIS. The alignment alternatives, station locations and design options selected for continued evaluation were evaluated using the measures and methods described in Chapter 2 (see Tables 2.3-1 and 2.4-1 through 2.4-5). The primary evaluation measures are listed below.

- Design objectives (including measures such as travel time and cost)
- Land use (including measures such as consistency with land use and general plans)
- Constructability (including measures such as track type construction and access to the corridor)
- Natural resources (including measures such as impacts to wetlands, potential threatened and endangered species habitat, and important farmlands)
- Environmental quality (including measures such as number of sensitive noise receptors)
- Additional considerations (including measures such as ability to meet project purpose and support by public and agencies)

The detailed evaluation of the subsection alignment alternatives, station location and design options is provided in the Evaluation Tables in Appendix A and discussed in sections 4.2 through 4.6. A summary of the alternatives to be carried forward for further consideration in the EIR/EIS is presented in Section 5.0.

4.2 Los Angeles Union Station

The station serves as the starting point for all Palmdale to Los Angeles alternatives. The station is being studied and reported on in the separate Los Angeles to Anaheim Supplemental Alternatives Analysis Report, published in July 2010.

Two options have emerged from the LAUS Alternatives Analysis process, an elevated station above the existing Metrolink and Amtrak platforms, and an 'at-grade' station with HST platforms to the west side of a reconfigured LAUS Amtrak/Metrolink station, within the existing station footprint. It is anticipated that both station options will be carried forward into the EIR/EIS and that a station site selection will be made as part of the Anaheim to Los Angeles HST Project environmental review process. This Palmdale to Los Angeles Alternatives Analysis Report carries these two station options for alternatives extending north from LAUS.

Given the importance of the station, and the direct connection of certain alignment alternatives to a specific station option, it is recognized that the development of alignment alternatives in the vicinity of LAUS will continue to be heavily influenced by the corresponding station options, and that the evaluation efforts will need to be coordinated through both the Alternatives Analysis and EIR/EIS phases.

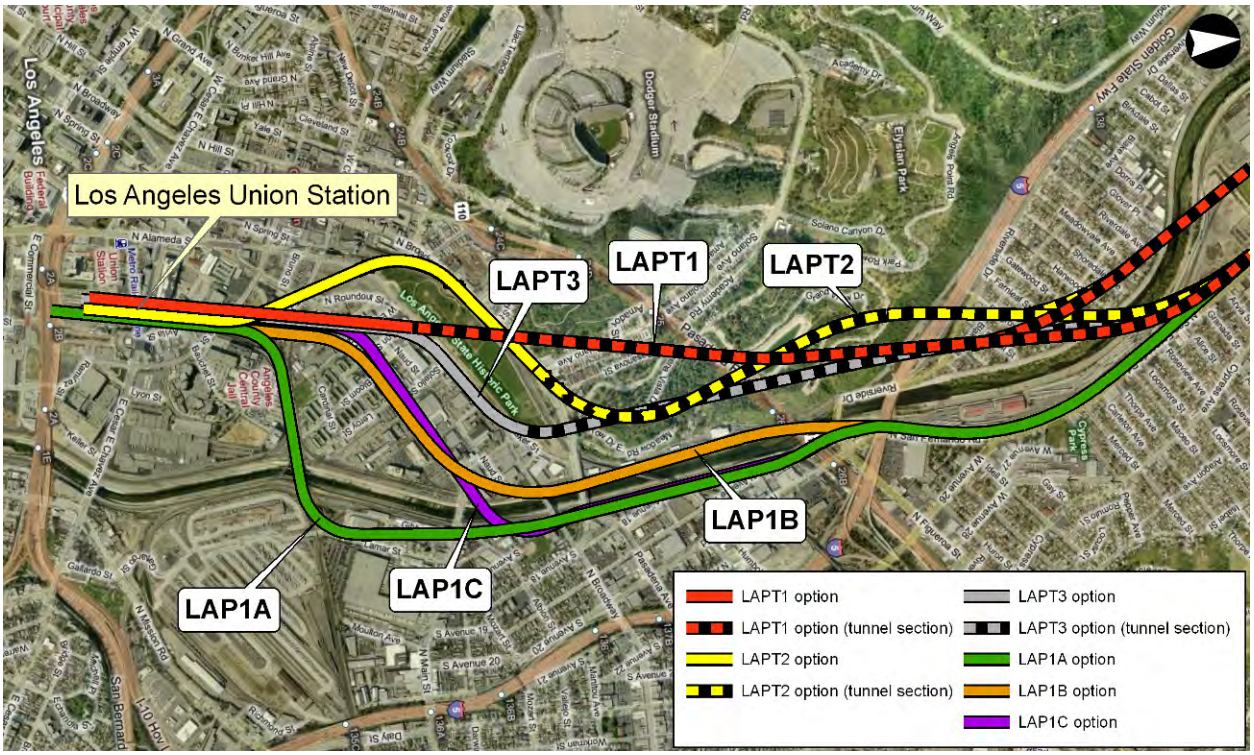
4.3 LAUS to Metrolink CMF

The alternatives carried forward for more detailed evaluation are LAPT1, LAPT2, LAPT3, LAP1A, LAP1B and LAP1C. Table A-1 in appendix A lists each of the alignment alternatives considered and identifies whether they are to be carried forward for further study or withdrawn from further consideration. Key factors that distinguishing factors among the alternatives are highlighted in the tables. As noted in the initial selection of alternatives, the broad corridor includes a mixture of transportation corridors, commercial and industrial uses, parks and residential communities in a highly urbanized setting. There are also many historic structures and archaeological sites in this area. The options selected to be carried forward here will continue to be refined to minimize impacts to these, to the surrounding communities, and to planned developments.

Each of the alignment alternatives would be generally consistent with the stated purpose and need of providing rapid and efficient transportation service. Each would be consistent with land uses in local plans because it would enhance mobility and regional connectivity with mass transit option opportunities. However each would conflict in different ways with other planning objectives by dividing existing communities by blocking access to surrounding land uses.

Each of the six alignment alternatives is shown in figure 4.3-1 and the performance of the six alignment alternatives against the evaluation measures is described below.

Figure 4.3-1 LAUS to Metrolink CMF Options



- **Alternative LAPT1** can only originate from an at-grade LAUS station – for an elevated station the gradient required to enter tunnel before the Los Angeles State Historic Park would exceed the maximum allowed by the design criteria. Roads between Vignes Street and Spring Street would need to be reconfigured or grade separated. 18 small industrial and 1 public parcels in this area would be affected. Though the surface would be fully restored upon completion, cut-and-cover construction for Alternative LAPT1 would cause temporary disruption across Los Angeles State Historic Park (LASHP), and affect the archaeological site which is currently being excavated. This is of serious concern to State Parks. The work could be staged to maintain use in unaffected portions of the park by managing the size of the work zone. After completion this alternative would have minimal effect on the LASHP as it passes beneath it in tunnel. North of the LASHP the alignment is in bored tunnel and would not have further impacts in this subsection. This alignment **is carried forward for further consideration** because it is the shortest, has the shortest journey time, and has permanent impacts localized in a small area north of LAUS.

  The plan and profile of this alternative are depicted on drawings LAP-CB1110 through 1114 in Appendix D.

- **Alternative LAPT2** can originate from either an at-grade or elevated LAUS station. 9 industrial parcels and 1 public/open space parcels would be affected as the alignment passes over Vignes, Main and Alameda Streets and the Gold Line on viaduct. It then runs between the Gold Line and Broadway and is not compatible with Metro plans for future additional Gold Line storage tracks and associated development in this area. It would require cut and cover construction across Broadway, disrupting traffic flow during construction. The work would proceed in steps, such that with the aid of temporary detours and temporary decking, an adequate number of lanes will be maintained during peak hours of travel. Beyond Broadway the alignment is in bored tunnel and would not have further impacts in this subsection. While this alignment would not directly affect the LASHP, the viaduct running alongside it would have a permanent visual and noise impact on the users of the park. Alternative LAPT2 **is carried forward for further consideration** because it gives the opportunity for reduced impacts using a tunnel alignment that is compatible with an elevated LAUS option.

  The plan and profile of this alternative are depicted on drawings LAP-CB1210 through 1214 in Appendix D.

- **Alternative LAPT3** can only originate from an at-grade LAUS station – for an elevated station the gradient required to enter tunnel before the LASHP would exceed the maximum allowed by the design criteria. Roads between Vignes Street and Spring Street would need to be reconfigured or grade separated. 23 industrial parcels and 3 public parcels would be affected, and a church would be displaced by the trench leading to the tunnel portal. This area is scheduled for redevelopment by the City of Los Angeles. This alternative would have minimal effect on the LASHP as it passed beneath it in bored tunnel. However it would be likely to require displacement of the Raphael Junction Block Building which was built in 1889 and designated a Historic Cultural Monument in 2007. North of the LASHP the alignment in bored tunnel would not have further impacts in this subsection. This alignment **is carried forward for further consideration**.

  The plan and profile of this alternative are depicted on drawings LAP-CB1310 through 1314 in Appendix D.

- **Alternative LAP1A** would originate from either an elevated or an at-grade LAUS station. The intention for this alternative was to maximize use of the existing rail footprint and minimize impacts on abutting development and the Los Angeles River. However, the need to cross the Los Angeles River on a small skew and the curvature required for HST operations creates a sweeping turn on the east bank that takes the HST alignment well outside the existing rail corridor and into private property between the river crossing and Main Street. It is not therefore successful in minimizing disruption, since 4 commercial, 27 industrial and 4 public parcels would be affected, including displacing the historically and culturally valued San Antonio Winery. It also has the potential to indirectly impact portions of other historic-period properties as a result of noise and vibration from construction and during operation. Taking the viaduct above the Metrolink special track work over the full length between LAUS and the east bank of the Los Angeles River, including a long span crossing of the river above an operational railway bridge will make construction particularly complex and increase disruption to Metrolink and Amtrak services. The need to rise on viaduct above Main Street, Spring Street and Broadway on the east bank of the Los Angeles River to preserve the historic bridges would render Alternative LAP1A visually intrusive and a source of noise. This alternative is on a high viaduct near multi-family dwelling units close to LAUS and beside a church, recreation center and historic jail. This alignment is unacceptable to some stakeholders. This alignment has the longest journey time because of the tight curves needed. Alternative LAP1A **is withdrawn from further consideration** for these reasons.

  The plan and profile of this alternative are depicted on drawings LAP-CB1410 through 1414 in Appendix D.

- **Alternative LAP1B** would originate from either an elevated or an at-grade LAUS station. The viaduct over Main Street would be visually intrusive and have potential noise and vibration impacts on multi-family dwelling units. 18 industrial and 3 public parcels would be affected. The viaduct crossing over the historic Spring Street and Broadway bridges would be visually intrusive. The at grade section on the west bank of the river, and in particular the extreme skew crossing of the Los Angeles River at the location of the existing Metrolink river crossing, would cause severe disruption to Metrolink services and the Gold Line yard. Connection from the Metrolink tracks to the south end of the Metrolink CMF would be permanently severed. For these reasons Alternative LAP1B **is withdrawn from further consideration.**

  The plan and profile of this alternative are depicted on drawings LAP-CB1510 through 1514 in Appendix D.

- **Alternative LAP1C** would originate from either an elevated or an at-grade LAUS station. The viaduct over Main Street would be visually intrusive and have potential noise and vibration impacts on multi-family dwelling units. Six commercial and 36 industrial parcels would be affected. It has the potential to indirectly impact portions of other historic-period properties as a result of noise and vibration from construction and during operation. The need to rise on viaduct beside the historic Main Street bridge and over the historic Spring Street and Broadway bridges on the east bank of the Los Angeles River to would render Alternative LAP1C visually intrusive and a source of noise. This alternative is on a high viaduct beside a church, recreation center and historic jail on the east bank of the river. This alignment has one of the longest journey times because of the tight curves needed.

However it does not impact LASHP and is compatible with an elevated or and at-grade LAUS station and for these reasons Alternative LAP1C **is carried forward for further consideration**.

The plan and profile of this alternative are depicted on drawings LAP-CB1610 through 1614 in Appendix D.

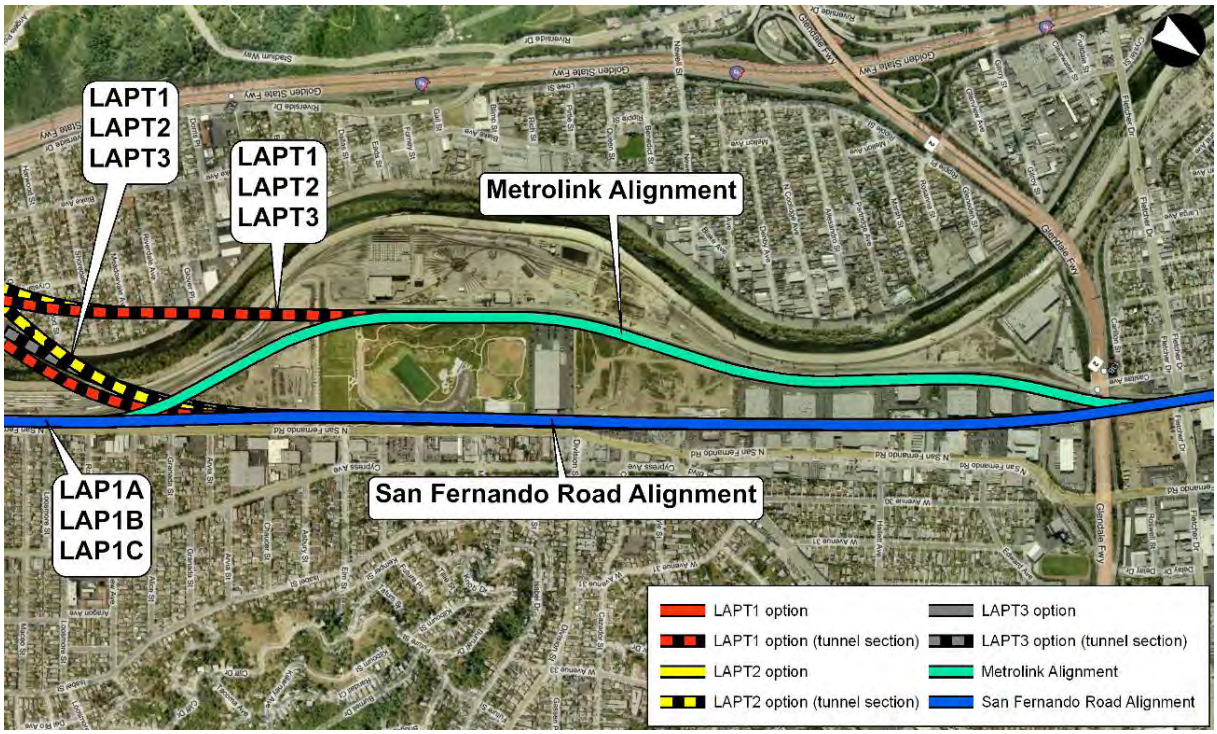
4.4 Metrolink CMF to SR 2

The alternatives carried forward from initial evaluation for more detailed evaluation are:

- Metrolink Alignment at-grade – A HST alignment that would follow the existing Metrolink/freight corridor, at-grade.
- Metrolink Alignment in trench – A HST alignment that would follow the existing Metrolink/freight corridor in a partially covered trench.
- San Fernando Road Alignment - A HST alignment that would follow the west side of San Fernando Road in a partially covered trench.

Table A-2 in Appendix A lists each of the alignment alternatives considered and identifies whether they are to be carried forward for further study or withdrawn from further consideration. Key distinguishing factors among the alternatives are highlighted in the tables. Each of the three alignment alternatives is shown in figure 4.4-1 and the performance of the three alignment alternatives against the evaluation measures is described below.

Figure 4.4-1 Metrolink CMF to SR 2 Options



Metrolink alignment at-grade alternative, the HST tracks would curve along the western edge of Rio de Los Angeles State Park and continue to parallel the existing tracks to SR 2. This is only compatible with alignments LAP1A, LAP1B and LAP1C, as the tunnel alignments cannot connect with the Metrolink alignment at-grade without significantly exceeding the permissible maximum gradient for HST tracks. The curves on this alternative limit speed to 60 mph and increase journey time by about 50 seconds compared with the San Fernando Road Alignment. The Metrolink at-grade alternative introduces a new barrier between the Rio de Los Angeles State Park and the Los Angeles River that would permanently impede opening up the park to the river in the future and is inconsistent with goals of the Los Angeles River Revitalization Master Plan. Noise impacts on users of the Park and on the new high school campus will be significant. For these reasons this alternative **is withdrawn from further consideration**.

Metrolink alignment trench alternative, the HST tracks for Alternative LAP1A, LAP1B and LAP1C would curve along the western edge of Rio de Los Angeles State Park in a partially covered trench and continue to parallel the existing tracks to SR 2. This would gain advantage if Metrolink were to also drop into a partially covered trench alongside Rio de Los Angeles State Park and the proposed high school campus, by opening up access to the River. However Metrolink concerns about sharing a trench with HST would need to be addressed and the connection to the north end of the CMF would need to be reconfigured to allow this to happen. The curves on this alternative for the surface alignments limit speed to 60 mph and increase journey time by about 50 seconds compared with the San Fernando Road Alignment. For the tunnel alternatives the portal would be part of the way along the RDLASP. By taking a more direct line from the north end of the high school and accepting some industrial displacements, the

journey time penalty for the tunnel options for this alternative can be reduced to 10 seconds. This alternative **is carried forward for further consideration** because it has least impact on RDLASP

San Fernando Road alternative would abut the west side of the road between I-5 and Division Street in the case of Alternative LAP1A or LAP1B, or between the south end of Rio de Los Angeles State Park and Division Street in the case of the tunnel alternatives. This alignment has a direct affect on RDLASP, reducing its area. To mitigate this for all alternatives, the HST tracks would be in a partially covered trench for lengths of up to 800 feet (based on ventilation and emergency evacuation considerations), to improve connectivity in general and pedestrian and vehicular access, favor recreational and landscaping enhancements, and allow for compatible uses such as parking. At Division Street, San Fernando Road turns away whereas the HST alignment for all three alternatives begins to veer northwest, to join the existing Metrolink corridor at SR 2. The profile would climb out of the trench in this second stretch, requiring a number of industrial displacements, to pass under SR 2 at-grade. For the San Fernando Road alignment, the existing tracks carrying Metrolink, Amtrak and freight traffic could also be diverted into trench with HST, separated by a suitable barrier. However, this would mean reconfiguration of the Metrolink yard and could prevent access to the yard from the north. This option **is carried forward for further consideration** because it offers journey time advantages.

These alignments are shown on the drawings for options LAPT1, LAPT2, LAPT3, LAP1A, LAPT1B and LAPT1C in Appendix D.

4.5 SR 2 to Sylmar

Between SR 2 and Sylmar, the alternatives carried forward provide dedicated, fully grade separated HST tracks that closely adhere to the existing Antelope Valley railroad right-of-way, with the HST tracks on the east side of the right-of-way (alternative ESS), and a horizontal alignment with a varying design speed chosen to minimize the need to depart from the right-of-way. The impacts from the track location and horizontal alignment apply to all alternatives and so have been detailed in Appendix C.

The array of alternatives is based on the following key variables:

- The trade-offs between vertical alignment and related impacts, and means of grade separating existing at-grade crossings.
- Potential station locations.

The alternatives carried forward from the initial review in section 3 are further analyzed with respect to the evaluation measures in sections 4.5.1 and 4.5.2.

4.5.1 Evaluation of Vertical Profiles

Three conceptual vertical profiles were carried forward for further evaluation as part of the initial development of alternatives:

- Profile A – A predominantly at-grade profile, elevated where there are at-grade crossings
- Profile B – A predominantly at-grade profile, with roads elevated, depressed or closed.
- Profile C – A predominantly at-grade profile, depressed where there are at-grade crossings

Existing bridges, washes and other infrastructure constrain the profile in many areas. In the initial development of alternatives it was established that the HST profile should be at-grade wherever there is an existing overcrossing, and either at-grade or elevated wherever there is an existing undercrossing or wash. Profiles of potentially viable options are shown on drawings LAP-CB2201 to 2217 in Appendix D.

It is expected that the preferred profile will emerge as a combination of elevated, at-grade, and depressed elements. The implementation of each grade separation would be site-specific, and will be developed during the preliminary engineering design. The alternatives evaluation has been carried out for a generic grade crossing, to establish the factors which will drive the selection on a case by case basis during development of the design. For this evaluation Profile B has been split into road over (B1) and road under (B2).

Table A-3 in appendix A lists each of the profiles considered and identifies whether they are to be carried forward for further study or withdrawn from further consideration. Key factors distinguishing among the profiles are highlighted in the tables. The performance of the four profiles against the evaluation measures is described below.

Further engineering design will consider modifications to Metrolink tracks to follow the same profile as the HST tracks to realize the benefits of grade separations. However, the grade limitations associated with the freight service which shares use of the Metrolink tracks, cost and potential impacts may make these modifications impractical or unreasonable.

HST station and related track criteria exert considerable influence on several thousand feet of profile to the north and south of the platforms. As such, station siting will be an important consideration in establishing a preferred vertical alignment.

The alternatives carried forward in the various profile segments will be combined into one or more continuous profiles, developed and refined to account for station requirements as their location is more firmly established.

The three fundamental profile choices have different construction costs: at-grade HST construction would generally be the least costly, particularly where existing at-grade crossings are widely spaced, while building the HST within a retained trench (the depressed profile) would generally be the most costly.

Profile A – Predominately At-Grade with Elevated Segments

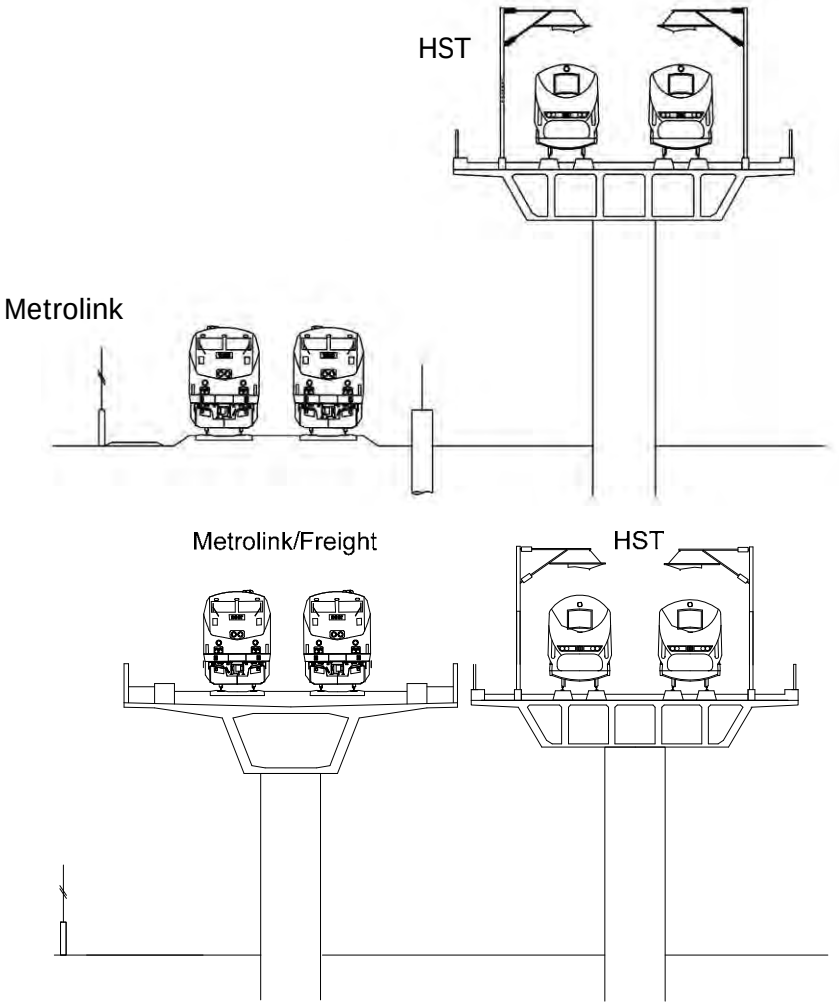
The segments that can be elevated are shown on the plan and profile drawings LAP-CB2201 to 2217 in Appendix D and are as follows:

- Over Chevy Chase Drive and West Broadway / Brazil Street
- Over Flower Street, Sonora Avenue and Grandview Avenue
- Over Empire Avenue and Buena Vista Street
- Over Sheldon Street and Branford Street
- Over Wolfskill Street, Brand Boulevard and Maclay Street

The following discussion applies to the elevated portions of Profile A.

Given the developed character of the urban/suburban setting of the SR 2 to Sylmar sub-section and the limited right-of-way, elevated portions of the vertical alignment would be predominantly carried on a viaduct structure (rather than on high berms or retained fill). A typical arrangement is shown in Figure 4.5-1. The viaduct structure would pass over obstructions along its route; these obstructions would include at-grade road crossings. The elevated profile would require minimal alterations to the existing road network and therefore would not be expected to necessitate right-of-way acquisition or displacements beyond those required by the choice of horizontal alignment and station location.

Figure 4.5-1 Elevated HST – Alternative Typical Arrangements



The proximity of some existing at-grade crossings to elevated highways and freeways that cross over the existing rail line means that this option is not a viable solution for these at-grade crossings.

In certain locations constraints, such as airport clearance requirements and seismic faults, rule out the elevated profile.

The potential for elevating the Metrolink/freight tracks along with the HST tracks will be evaluated with the railroad operators during preliminary design. The main benefit from elevating both is the elimination of existing at-grade crossings, which are a constraint on road traffic, result in safety concerns, and also constrain rail speeds and operations.

The construction of the viaduct structures required for the elevated alignment may impact existing utilities and watercourses within the rail corridor, but because of its smaller ground-level footprint and flexibility in the placement of columns, it is likely to cause the least impact to these features of the three conceptual vertical profiles. However, foundations would still have to be carefully located to avoid conflicts and some diversions or utility protection may be necessary.

The elevated profile would create the most visual and noise impacts, but would provide significant advantages with respect to displacements and improvements to traffic flow and so **is carried forward for further consideration.**

Profile B – Predominately At-Grade

The at-grade option is a valid alternative for the whole section except for the section between Empire Avenue and Buena Vista Street, where Metrolink is being elevated as part of the I-5 HOV lane project. A typical at-grade arrangement is shown in Figure 4.5-2.

Figure 4.5-2 At-Grade HST – Typical Section

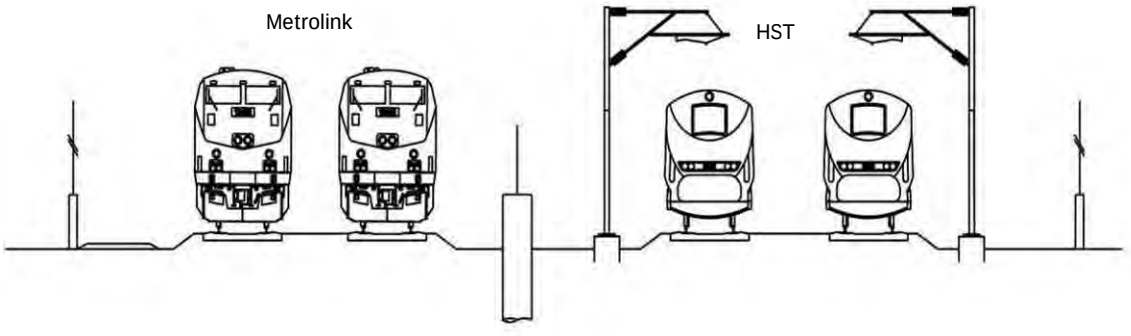


Figure 4.5-3 Typical Existing At-Grade Crossing (Osborne Street)

To allow at-grade HST construction, the existing at-grade street crossings, see Figure 4.5-3, would need to be removed by realigning the road over or under the rail corridor or in the case of a few lightly-used crossings, by closing the cross street at the rail corridor. For safe operations, there can be no at-grade crossings of the HST tracks.

If a cross street were to be closed at the rail corridor, a grade separated pedestrian and bicycle crossing could be provided in its place where there is local demand for such a facility.

Preliminary investigations into crossing treatments and their impacts have been undertaken but require additional study and discussion with the affected communities. Examples of road realignments over and under the rail corridor accomplished by prior projects are shown in Figure 4.5-4 and Figure 4.5-5. Where these solutions would cause excessive community impacts, one of the other profiles, passing the HST tracks over or under the cross street, would be proposed.

Figure 4.5-4 Existing Overpass at Western Avenue

Figure 4.5-5 Existing Underpass at Alameda Avenue

Profile B1 – At-Grade with elevated cross streets

Many of the road realignments would require right-of-way acquisition and some would require property displacements - to provide frontage roads beside elevated streets. The majority of these displacements would involve commercial entities, but could extend into residential areas. Where at-grade crossings are close to each other, disruption could affect an area for an extended period while each crossing was grade separated in turn.

This profile would also permanently disrupt traffic flow by breaking the link between San Fernando Road and arterials crossing the rail right-of-way, requiring new connections back to San Fernando Road in some cases.

The construction of the grade separated crossings will include substantial lengths of fill for roads passing above the tracks. Proposed fill areas would be expected to cause some impacts to utilities, because of the additional depth of cover, additional loading and access complications. To avoid these impacts it may be necessary to use lightweight fill, strengthen the utility crossing, or bridge over it.

The at-grade profile with elevated cross streets would be generally easiest and least costly to construct and so **is carried forward for further consideration.**

Profile B2 – At-Grade with depressed cross streets

Many of the road realignments would require right-of-way acquisition and some would require property displacements - to provide frontage roads beside depressed streets. The majority of these displacements would involve commercial entities, but could extend into residential areas. Where at-grade crossings are close to each other, disruption could affect an area for an extended period while each crossing was grade separated in turn.

This profile would also permanently disrupt traffic flow by breaking the link between San Fernando Road and arterials crossing the rail right-of-way, requiring new connections back to San Fernando Road in some cases.

The construction of the grade separated crossings will include substantial lengths of cut for roads passing below the tracks. Cut areas are expected to cause extensive utility diversion or relocation since the whole space between and roadway and the underpass soffit would need to be clear of any utility conflict. Affected utilities would need to be rerouted to the sides (gravity lines) or beneath the underpass (pressure lines, flexible lines), with proper access, clearance, cover, and protection.

The at-grade profile with depressed cross streets (B2) would be more complex and costly than elevating the cross streets (B1), but still less costly than elevating both metro and HST tracks (A), the cost advantage is less marked where closely spaced at-grade crossings will require grade separations. Because the clearance required between road and rail is less for this profile than for profile (B1) it will require shorter ramps which can have advantages for traffic flow and displacements in some situations, and so **is carried forward for further consideration**.

Profile C – Predominately At-Grade with Depressed Segments

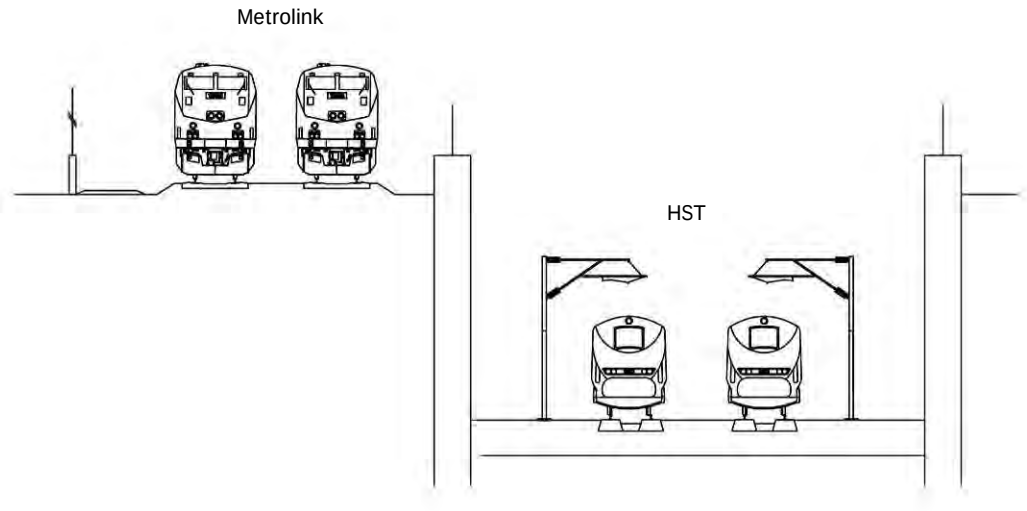
The segments which can be depressed are:

- Beneath Chevy Chase Drive
- Beneath Flower Street, Sonora Avenue and Grandview Avenue
- Beneath Sunland Boulevard
- Beneath Osborne Street, Pierce Street and Van Nuys Boulevard
- Beneath Polk Street and Bledsoe Street
- The following discussion applies to the depressed portions of Profile C.

Where depressed, the profile would be contained largely within a retained cut trench. Metrolink have indicated that Metrolink/freight tracks may not be able to share a trench with HST because of equipment and operational incompatibilities, and so they would likely remain at-grade. A typical arrangement is

shown in Figure 4.5-6. The HST alignment would pass under existing at-grade crossings along its route. The depressed profile would require minimal permanent alterations to the existing road network and not cause right-of-way acquisitions or displacements beyond those required by a station and horizontal alignment. During construction, there would be disruption at each existing crossing while the trench is built and bridged over, and the footprint for trench construction would likely exceed that required for at-grade or elevated structures.

Figure 4.5-6 Depressed HST – Typical Section



A depressed alignment is not a viable solution where underpinning of, or alterations to foundations supporting major existing elevated structures would be required. A depressed alignment should not be considered at crossings under elevated freeways and major arterials or under at-grade crossings that would cause the depressed profile to extend beneath structures carrying elevated freeways and major arterials.

If the HST were depressed but the Metrolink/freight tracks remained at-grade, future opportunity for removing grade crossings would become limited, since the HST trench would block the opportunity to pass cross streets under the Metrolink/freight tracks.

Construction of the structures required to retain the trench of a depressed alignment would impact existing utilities and watercourses within the rail corridor. There would be significant impacts on gravity storm water and sewage systems that traverse the HST path. This could include the introduction of pumping stations and may require re-planning the utility system network in the vicinity. At major water crossings, the HST trench would need to be deepened enough to allow the watercourses to be channeled over the HST.

While this option could provide noise and visual impact benefits, for the majority of the route they would be largely lost due to the low sensitivities of the predominant neighboring land uses. Because

Metrolink/freight tracks would be likely to remain at-grade the benefit from removing existing at-grade crossings would be lost.

Where airport flight clearances would clash with the OCS for the HST this alternative may be the only viable solution and so it **is carried forward for further consideration**, but is likely only to be adopted in such locations.

4.5.2 Evaluation of Station Alternatives

With all the potential station sites carried forward from initial evaluation lying within 8 miles or less from one another, station spacing and its implications to HST operations, ridership, and trip duration need to be further considered. Station separations of less than 10 miles (Burbank Buena Vista – San Fernando/Pacoima) are not generally suitable for high speed service and separations of less than 4 miles (Branford-Pacoima/San Fernando) would not be acceptable. Consequently, the ridership has been analyzed to determine whether a single station would accommodate the region's potential ridership demand.

The original estimates for the 2035 full system using two stations indicated significantly higher projected ridership at a north San Fernando Valley station location compared to a south Valley station location (around 13,000 daily boardings in the north and only around 4,000 in the south). Ridership has therefore been analyzed for a single station placed either in the north of the Valley or in the south of the Valley to determine whether the location of the single station has a significant effect on ridership.

The 2035 estimates indicate that replacing two stations in the Valley with a single station will not significantly reduce the number of passengers using HST. With a single station in the north Valley the estimates suggest that total boardings at Union Station, the Valley station, and Palmdale station would be reduced by about 2% while with a single station in the south Valley the boardings would be reduced by about 5%. In addition, the calculations suggest that the time savings resulting from having one less stop for the non-express service mean that boardings elsewhere on the system would be increased, so that overall ridership on the HST system would not be reduced.

Consolidation into a single station would reduce the need for additional track and right-of-way, simplify construction, maintenance and operation of the system, reduce impacts, and construction and operation costs.

This analysis demonstrates that a single station in the San Fernando Valley, to be selected from among the four alternatives carried forward for evaluation, would best serve the project's goals.

Table A-4 in appendix A lists each of the four station location alternatives considered and identifies whether they are to be carried forward for further study or withdrawn from further consideration. Key factors that distinguish the stations from one another are highlighted in the tables. The performance of the four station locations against the evaluation measures is described below.

In considering station locations it is valuable to recall that stations need to be placed on straight track extending at least six thousand feet, two additional platform tracks are to supplement the two express tracks over this length, and the 1380 foot long platforms are to have minimal longitudinal slope. As such, they are imposing facilities that require ample space and will benefit from good parking provisions, strong

connectivity, and promising transit related development potential. The stations and associated developments will be likely to require modifications to the local road network and freeway ramps.

Alternative BVS – Burbank Buena Vista Site

The Burbank Buena Vista station site would be located between North Buena Vista Street and Hollywood Way in the City of Burbank (see Figure 4.5-7). Hollywood Way is an arterial that serves as the gateway into Bob Hope Airport and provides connectivity by means of grade separated connections to San Fernando Road, two full interchange connections with the I-5 freeway a half mile to the east and south, and an intersection with Glenoaks Boulevard about 300 feet beyond I-5.

Figure 4.5-7 Burbank Buena Vista Station Option

The site is located within the Golden State Redevelopment Project area which is mostly comprised of industrial and heavy commercial uses. The plan proposes to rehabilitate deteriorating structures, and encourage development of new commercial and office uses. The station platforms would be on a low embankment.

This station alternative is 3 miles from the Burbank Metrolink station and 1.5 miles from the Sun Valley Metrolink station. Introducing or relocating a Metrolink station to provide an interchange with the HST would need to be endorsed by and coordinated with Metro/Metrolink. There is the potential to link the

HST station with the Burbank Airport and its planned transit center, 1.5 miles away. This location therefore offers the best potential for broadened intermodal connectivity. This option is favored by the City of Burbank and **is carried forward for further consideration**.

This option is shown on drawings LAP-CB 2308 to 2310 in Appendix D.

Alternative BSS – Branford Site

The Branford Street Station site would be located between Branford Street and Osborne Street in Los Angeles/Pacoima. See Figure 4.5-8. Branford Street has a partial interchange with I-5 one mile to the west, and intersects Laurel Canyon Boulevard three quarters of a mile to the west and Glenoaks Boulevard three quarter of a mile to the east. Osborne Street has a full interchange with I-5 one mile to the west, and also intersects Laurel Canyon Boulevard and Glenoaks Boulevard three quarters of a mile to the west and east, respectively.

Figure 4.5-8 Branford Street Station Option

The surrounding area features broadly mixed use. The area south of Branford Street is dominated by quarries and Los Angeles County water retention ponds (used for ground water recharge and to reduce peak flood flows in Tujunga Wash). The disused quarry can be filled in (the HST project will generate significant volumes of soil suitable for filling) and this can create an opportunity for development. Both

sides between Branford and Montague Streets are primarily taken up by automotive salvage yards. Between Montague Street and Osborne Street both sides of the rail corridor are fronted by commercial use, but residential areas back up to these. The same is true north of Osborne Street, on the west side of the right-of-way. The east side north of Osborne Street is occupied by Whiteman Airport.

This station alternative is 4 miles from San Fernando Metrolink station and 2.5 miles from Sun Valley Metrolink station. Introducing or relocating a Metrolink station to interchange with the HST would need to be endorsed by and coordinated with Metro/Metrolink.

The station platforms would be on low embankment. To achieve acceptable gradients for the station and approaches, the HST tracks need to be in trench at Osborne Street, to achieve grade separation while keeping below Whiteman Airport flight zone, at-grade at Branford Street, and elevated at Sheldon Street. Branford Street will need to be raised or lowered to cross the right-of-way. The Verdugo fault, which is potentially active, runs parallel to and close to the alignment in this area. This option **is carried forward for further consideration** because it has fewer impacts on adjacent properties.

This option is shown on drawings LAP-CB2412 to 2414 in Appendix D.

Alternative PWS – Pacoima Site

The Pacoima Wash Station site would be located between SR 118 and Pacoima Wash in Los Angeles/Pacoima. See Figure 4.5-9. To the south, San Fernando Road includes full interchange with SR 118 and an intersection with Paxton Street. SR 118 is elevated in this area and the westbound ramps pass over Paxton Street. SR 118 links with I-5 and I-210 within a mile of the HST corridor. To the north, beyond the Wash, Fox street extends to the west, intersects Laurel Canyon Boulevard at approximately three quarters miles and passes under I-5. Further north, Brand Boulevard also connects with Glenoaks Boulevard and points east, and intersects Laurel Canyon Boulevard and features a partial interchange with I-5 about a mile to the west. Pacoima Wash interrupts much of the street network. The nearest crossings are north-south running Bradley Avenue, Herrick Avenue, and Glenoaks Boulevard.

Figure 4.5-9 Pacoima Wash Station Option

The HST track alignment is constrained by the Pacoima Wash north of the platforms and the SR 118 freeway bridge to the south of the platforms. To be at-grade the platforms would need a 1% gradient which does not meet the engineering requirements for station platforms. To achieve acceptable gradients for the station platforms, the HST tracks would need to be either in a deep trench under the Wash, or on a high viaduct over the freeway bridge. The trench would require reconstruction of the freeway bridge and a new bridge to carry the Wash over the trench. Construction of the trench and bridges would require temporary diversion of the freeway and the wash over an extended period and so this option has not been considered further. The viaduct would be about 3 miles long and up to 60 feet high, with heavy through truss girders for the long span over the freeway. The viaduct south of the freeway would extend into the Verdugo Fault zone. Steep gradients would be needed for the viaduct. Additionally the station platform would be approximately 60 feet above grade. The station design would be challenging, however, the City Redevelopment Agency considers this area as a potential re-development region. If a redevelopment plan is enacted that removes/relocates existing industrial activity, it is conceivable that sufficient acreage could be assembled to create an attractive redevelopment opportunity. It could also be argued that the height of the station is an unreasonable visual intrusion into the community. This option is favored by the City of Los Angeles and the City Redevelopment Agency and **is carried forward for further consideration**.

This option is shown on drawings LAP-CB2514 to 2516 in Appendix D.

Alternative SFS – Sylmar / San Fernando Site

The Sylmar / San Fernando station location alternative would be located between Hubbard Street and Maclay Avenue in the City of San Fernando. See Figure 4.5-10. At the south end, Brand Boulevard connects with Glenoaks Boulevard to the east and Laurel Canyon Boulevard and I-5 to the west. The San Fernando Road/SR 118 freeway interchange is located half a mile to the south. At the north end, Hubbard Street connects with Glenoaks Boulevard to the east and Laurel Canyon Boulevard to the west.

Figure 4.5-10 Sylmar / San Fernando Station Option

The station site is located in an area proposed for revitalization as part of the San Fernando Corridors Specific Plan. However, the amount of available space for new development is still fairly limited given the proximity of single family residential homes to the east and the existing street network in the area.

The existing Sylmar/San Fernando Metrolink station is one mile north of this HST station alternative.

The San Fernando fault zone extends between Hubbard Street and Sayre Street. Because the fault is to be traversed as close to at-grade as possible, the vertical placement for a station location south of Hubbard Street is constrained. Maclay Avenue, Brand Boulevard and Wolfskill Street to the south of the

station are closely spaced and difficult to grade separate without residential displacements, and so these are crossed by HST on viaduct. To accommodate a station the HST tracks need to be west of the existing right-of-way, requiring significant commercial displacements. However since the area would be substantially remodeled for the station and associated developments this is not a fatal flaw. This option is favored by the City of San Fernando and **is carried forward for further consideration**.

This option is shown on drawings LAP-CB2615 to 2617 in Appendix D.

4.6 Sylmar to Palmdale

The Sylmar to Palmdale subsection of the alignment through the San Gabriel Mountains has a much broader geographic spread of alignment alternatives, there being no existing transportation route or other corridor that would be a suitable basis for the HST alignment. Two main existing transportation routes through the mountains between Sylmar and Palmdale are the existing Metrolink alignment and Soledad Canyon Road, both following Soledad Canyon over part of their length but generally unsuitable for HST operations because of their many tight curves. A third is the SR 14 freeway, which also has curves with too small radius to achieve HST design speeds, and also has excessive gradients. Therefore, as described above in Section 3, a range of alignments were developed taking into account the terrain and the various constraints. All these alternatives come together to rejoin the existing UPRR/Metrolink alignment in Palmdale.

Given the rugged mountain terrain between Sylmar and Palmdale, each alignment alternative is defined by a particular combination of horizontal, vertical, and structural (tunnels and viaducts) characteristics deemed to suit its path and purpose. The initial review process carried forward four alternatives for more detailed study and evaluation:

- Soledad Canyon – An alignment that adheres to the intent of one of the original programmatic alignments to follow the Soledad Canyon corridor and passes east of Lake Palmdale.
- SR 14 East – previously referred to as SR 14 Closer –An alignment that stays close to the SR 14 Highway through the Acton area and passes east of Lake Palmdale.
- SR 14 South – previously referred to as Quantm SR 14 – An alignment also passing to the east of Lake Palmdale but taking a more direct route passing closer to the Acton downtown area.
- SR 14 West – previously referred to as Quantum SR 14 Closer – An alignment that stays close to the SR 14 Highway through the Acton area but passes west of Lake Palmdale.

The initial review of potential station locations concluded that a station at Palmdale would best meet the project's purpose and the region's needs. However, the four alignment alternatives give rise to different station site options within Palmdale, as discussed in section 4.6.2.

4.6.1 Evaluation of Alignment Alternatives

Table A-5 in appendix A lists each of the alignment alternatives considered and identifies whether they are to be carried forward for further study or withdrawn from further consideration. Key distinguishing factors among the alternatives are highlighted in the tables. The performance of the four alignment alternatives against the evaluation measures is described below. Since the earlier stages of the Alternatives Analysis process had shown that there was only one practical alternative between Sylmar

and Sand Canyon which met the purpose and need, this section is common to all four alignment alternatives under active consideration, as described below.

Elements Common to All Alternatives

The common portion of the alignment is shown on detailed drawings LAP-CB3100 to 3103 in Appendix D.

The alignment for the Sylmar to Palmdale subsection begins in Sylmar and runs northwest along San Fernando Road at-grade, passing Roxford Street which will need to be raised to maintain the intersection with the San Fernando Road. From Olden Street, where the Metrolink tracks turn to the west, the HST alignment continues straight on to the north west and starts to climb steeply on a viaduct to gain sufficient elevation to cross above Foothill Blvd and the I-210 and also to cross the Santa Susana fault at grade. The Santa Susana fault is currently classified as “active,” meaning that there is evidence of seismic movement during the Holocene Period (over the last 11,000 years). Therefore, the crossing of this fault must occur “at-grade”, on a low embankment, or in cut.

This elevated alignment will impact some commercial properties adjacent to the Metrolink tracks and a trailer park north of Olden Street before entering the power line easement adjacent to the Los Angeles County Juvenile Hall, as illustrated in Figure 4.6-1. The power lines will need to be relocated to avoid the viaduct.

Figure 4.6-1 Viaduct between Olden Street and Filbert Street

After crossing over Foothill Blvd and the I-210 freeway, the alignment runs on embankment through the Santa Susana fault zone before entering a tunnel to the north of the zone at the base of the San Gabriel Mountains.

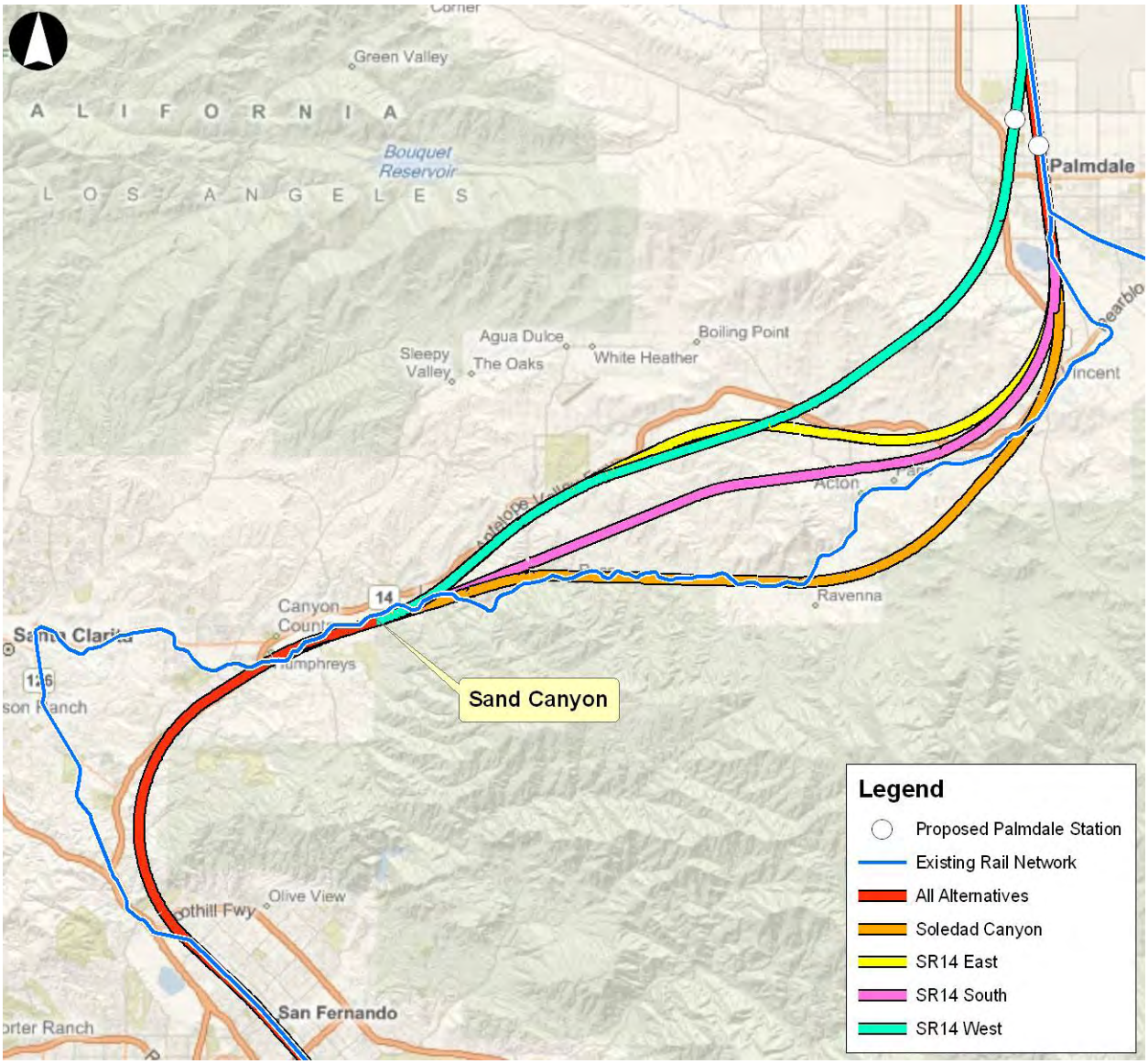
The route continues through the San Gabriel Mountains in a 7-mile long tunnel passing beneath Placerita Canyon and under the newly developed Via Princessa area, crossing beneath the SR 14 and Lost Canyon Road. A mid-tunnel ventilation shaft would likely be located just south of the alignment's intersection with Placerita Canyon Road. This tunnel would pass through the San Gabriel fault which is currently classified as "potentially active" meaning that further investigation is needed to estimate the risk of seismic movement and decide whether a fault chamber is needed, and how large it should be. It should be noted however that the most recent surface rupture of this fault at its intersection with the CHSTP alignment is considered to have occurred during the late Quatenary period, approximately 0.7 to 1.6 million years ago. The tunnel portal would be just east of the Lost Canyon Road. The Metrolink tracks will need to be re-aligned to the north of the HST to allow the HST alignment to rise quickly, to reduce impacts on local communities and rise over Sand Canyon Road. The alignment continues eastward on

viaduct and combinations of cut and fill until approximately one mile east of Oak Springs Canyon Road, at which point the four alternatives under consideration diverge.

The horizontal and vertical alignments of all four alternatives are designed for a speed of 250 mph for the majority of the route. The exception is the southern horizontal curve exiting Sylmar where the design speed is initially 215 mph rising to 220 mph. Figure 4.6-2 illustrates the horizontal alignment of the four alternatives.

As with the rest of the Palmdale to Los Angeles corridor, all highways, local roadways, and other rail operator crossings will need to be grade separated to ensure maximum safety for rail passengers and road users. The crossings of major highways, railways, and local roadways between Sylmar and Sand Canyon, and the approach that is proposed at each crossing, are listed in Appendix B.

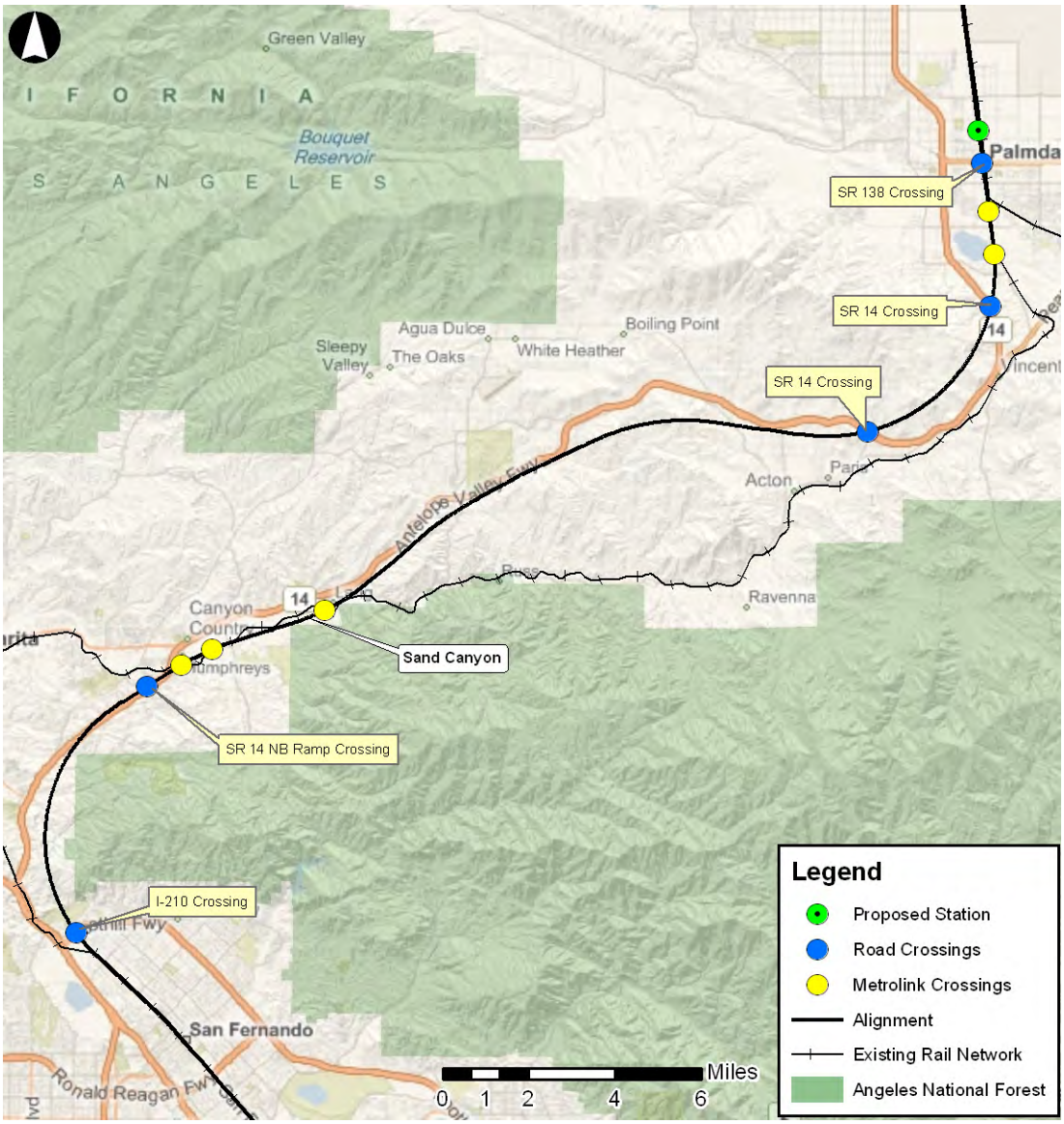
Figure 4.6-2 Sylmar to Palmdale Alignment Alternatives



SR 14 East Alternative

The overall alignment is shown in Figure 4.6-3 below. Detailed drawings LAP-CB3100 to 3115 are included in Appendix D.

Figure 4.6-3 SR 14 East Alternative – Major Crossings



From Sand Canyon, the SR 14 East alignment curves towards Bee Canyon, crossing Metrolink, Santa Clara River, and Soledad Canyon Road on a viaduct 30-foot to 40-foot high. Through Lang Station, Metrolink may require realignment over a distance of 2500 feet to accommodate the HST viaduct. The alignment enters a tunnel higher up Bee Canyon, southeast of SR 14. It continues in tunnel parallel to SR 14 and exits to cross Escondido Canyon and Santa Margarita Canyon on elevated structures, varying from 30-foot to 100-foot in height, before entering another tunnel adjacent to Vasquez Rocks Park that extends beneath the Santa Margarita hills.

From Santa Margarita Canyon to the Town of Acton, the SR 14 East Alternative continues to parallel the SR 14 highway. The alignment passes beneath the canyon in a four-mile tunnel emerging in the Acton area. The route continues through the north part of Acton on viaduct passing the south west corner of Soledad Agua Dulce Union School. From Acton, the alignment begins to curve towards the city of Palmdale entering a six-mile long tunnel in east Acton approximately two miles west of SR 14 and Sierra Highway, and continuing through the San Gabriel Mountains. It emerges from the tunnel after passing with adequate clearance under the California Aqueduct.

South of Lake Palmdale, the HST enters the San Andreas Fault zone. The crossing of this fault must be essentially "at-grade," i.e. on low embankment, in shallow cut, or at-grade. As a result of this constraint and to avoid the need to put HST on a structure to cross the existing railroad, highway, or Lake Palmdale, the alignment of the Metrolink tracks and Sierra Highway must be realigned to run along the east side of the HST as far as the junction with the UPRR north of Avenue S. This will require some reconstruction of the southern end of the dam that creates Lake Palmdale, and may require some construction on the western edge of Una Lake. The intersection of the Sierra Highway and Avenue S will need to be lowered such that Avenue S passes beneath the HST.

North of the San Andreas Fault zone, the alignment continues at-grade within the west side of the UPRR right-of-way as far as Avenue R where a grade-separated junction will need to be provided for Avenue R to pass over the HST. The alignment descends into a trench beneath Palmdale Boulevard (SR 138). North of Palmdale Boulevard, the alignment levels out to accommodate the at-grade Palmdale Station alternative in the vicinity of the existing Metrolink Station.

At the north end of the station, where the Sierra Highway crosses the existing UPRR, the highway will need to be elevated over the HST.

Summary

- The SR 14 East alignment just touches the edge of the Angeles National Forest. It crosses lands belonging to the Bureau of Land Management for a total of 1.9 miles.
- The route has five tunnels (10 portals) with a total tunnel length of approximately 19 miles. The longest individual tunnel is approximately 7.0 miles long.

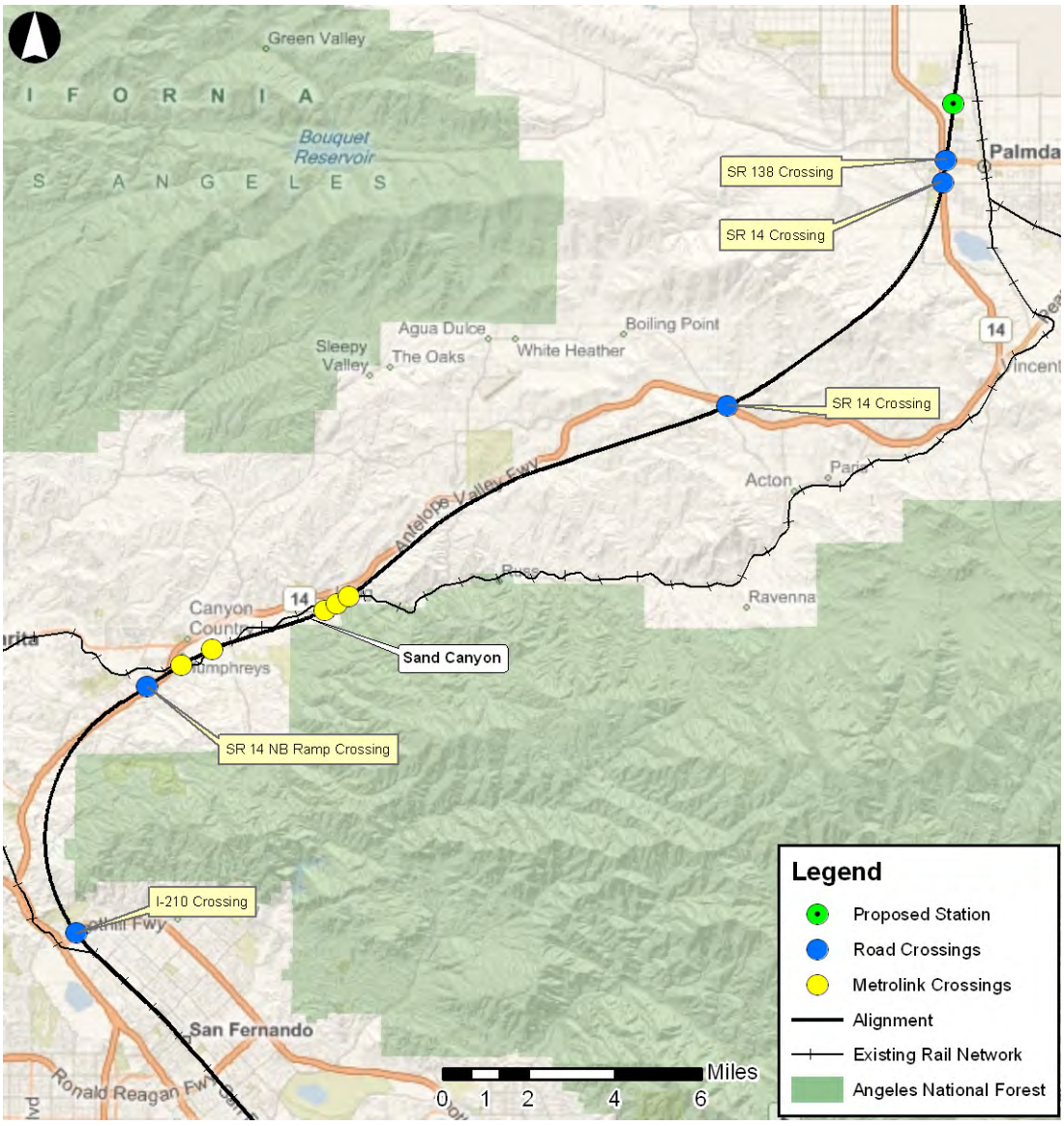
The crossings shown on Figure 4.6-3 and all crossings of major highways, rail operators, and local roadways between Sand Canyon and Palmdale are tabulated in Appendix B.

The SR 14 East Alternative has a comparatively low potential for impacts to residential, commercial and industrial properties, and so **is carried forward for further consideration**. It has neither the highest nor lowest construction cost. It has no impact to parks, but it encroaches into one school in the Acton area. It has the highest impact to designated agricultural land, and has the highest number of historical properties within ½ a mile of the route, but the least visual impact to recreational areas.

SR 14 West Alternative

The overall alignment is shown in Figure 4.6-4 below. Detailed drawings LAP-CB3204 to 3214 are included in Appendix D.

Figure 4.6-4 SR 14 West Alternative – Major Crossings



The SR 14 East and SR 14 West Alternatives share the same alignment for approximately eight miles from Sand Canyon.

From Sand Canyon, the SR 14 West alignment starts to curve towards Bee Canyon, crossing Metrolink, Santa Clara River, and Soledad Canyon Road on a high viaduct, ranging from 50 feet to 180 feet in height. Through Lang Station, the Metrolink alignment may require realignment over a 2500 feet distance to accommodate the HST viaduct. This viaduct could be up to 180 feet high in order to maintain the requirements that the grade be no steeper than 3.5% over up to a 3.7 mile section and an average of not more than 2.5% over any 6.2 mile distance. The SR 14 West alignment enters a tunnel higher up

Bee Canyon, southeast of SR 14. It continues in tunnel parallel to SR 14 and exits to cross Escondido Canyon and Santa Margarita Canyon on elevated structures, ranging from 30 feet to 80 feet high, before entering another tunnel at Big Springs Road. Exiting the tunnel at the Ward Road interchange, the HST would cross over SR 14, Sierra Highway and Red Rover Mine Road on a 50-foot high structure, and enter another long tunnel.

The alignment completely avoids the developed area of Acton, but would impact several rural residential properties in the Red Rover Mine area. The alignment emerges from the last tunnel south of the California Aqueduct, and continues west of Lake Palmdale as it approaches the City of Palmdale.

The requirements to cross the San Andreas fault at-grade brings the SR 14 West profile into conflict with the aqueduct, requiring that a siphon be inserted at the crossing point. This will require further discussion with the Department of Water Resources, (there is another siphon taking the aqueduct beneath the Sierra Highway nearby).

The crossing of the San Andreas Fault zone must be essentially "at-grade," i.e. on low embankment, in shallow cut or at-grade. The alignment cuts through the low hills that are formed at the fault in this location. North of the San Andreas Fault zone the alignment stays high to cross SR 14 and its interchange with Palmdale Boulevard (SR 138) on viaduct. North of SR 138 the alignment descends steeply to accommodate an at-grade station option just north of Rancho Vista Boulevard (E. Avenue P). Technology Drive and Rancho Vista Boulevard would need to be elevated above the HST.

North of the station, the SR 14 West alignment continues at-grade through Palmdale to Avenue M at the Lancaster City limits.

Summary

- The SR 14 West alignment just touches the edge of the Angeles National Forest.
- The route has five (5) tunnels (10 portals) with a total tunnel length of approximately 16.7 miles. The longest individual tunnel is approximately 7.0 miles long.
- The route has the shortest length and fastest journey time.

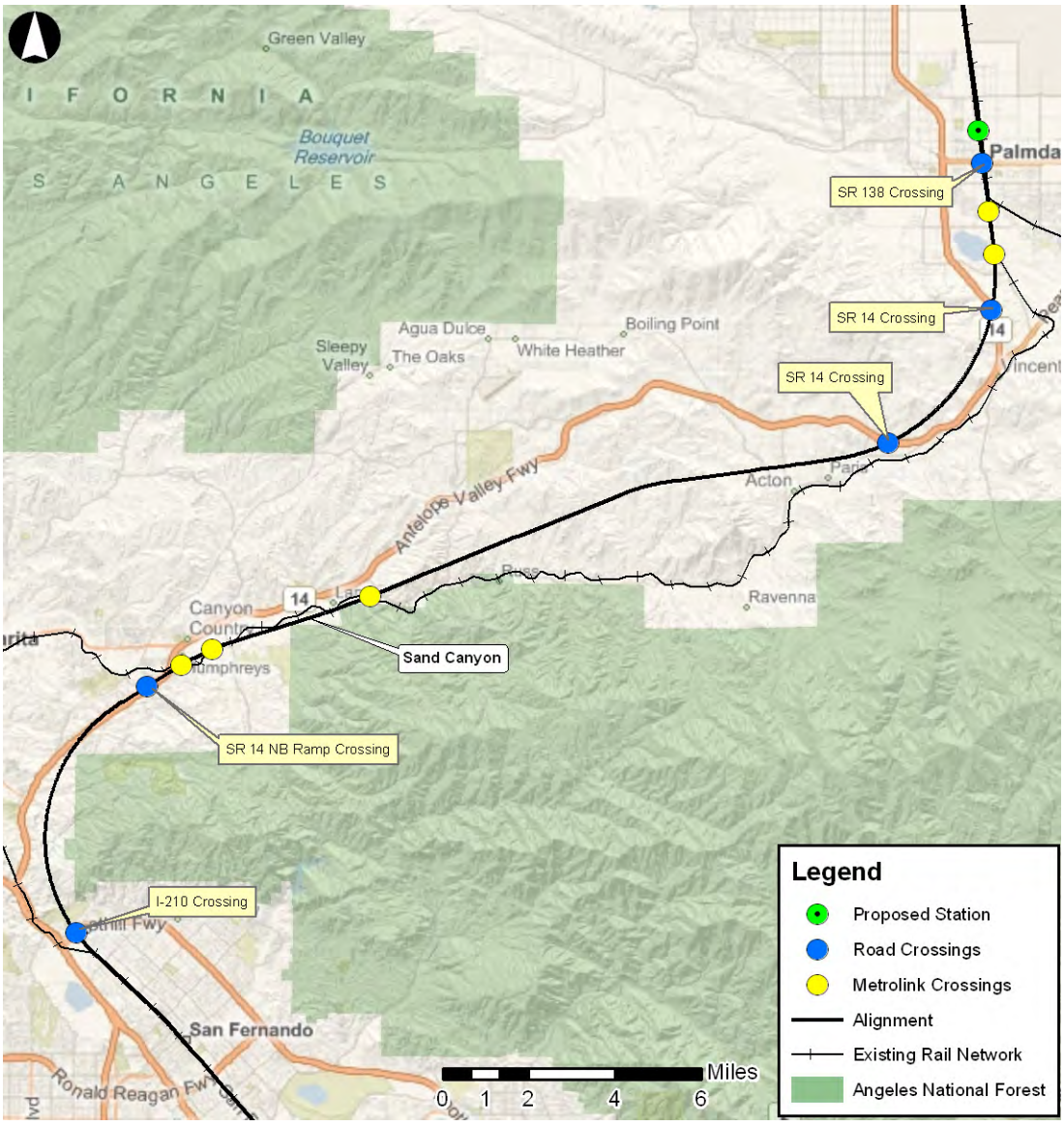
The crossings shown on Figure 4.6-4, and all crossings of major highways, rail operators, and local roadways between Sand Canyon and Palmdale are tabulated in Appendix B.

The SR 14 West Alternative has the shortest route length and shortest journey time and so **is carried forward for further consideration**. It has the lowest potential for impacts to residential, commercial and industrial properties. This alternative is also expected to be the least expensive. It has the highest structures (up to 200-feet high). It impacts one school and one park in Palmdale, but is the only alternative which does not impact Una Lake and the dam at Lake Palmdale.

SR 14 South Alternative

The overall alignment is shown in Figure 4.6-5 below. Detailed drawings LAP-CB3304 to 3315 are included in Appendix D.

Figure 4.6-5 SR 14 South Alternative – Major Crossings



From Sand Canyon, the SR 14 South alignment extends east, passing through the Lang Quarry in a series of cut sections and viaducts ranging from 30 feet to 90 feet in height. The alignment continues across Metrolink, Soledad Canyon Road, Bee Canyon, and the Santa Clara River on a 3,300-foot long viaduct through this area. The alignment enters a series of two tunnels beneath Three Sisters Rock for a distance of nine miles. The open gap between the two tunnels is at a crossing of Agua Dulce Canyon Road.

The alignment emerges from the tunnel as it approaches the Acton area. It passes through the Town of Acton predominantly on viaduct. At Acton, the alignment begins to curve northward towards Palmdale,

passing over Santiago Road and beneath SR 14 and Sierra Highway, to again re-enter a tunnel. It emerges from tunnel and continues on embankment crossing the California Aqueduct at-grade as it approaches Palmdale.

The requirement to cross the San Andreas fault at-grade brings the SR 14 South profile into conflict with the aqueduct, requiring that a siphon be inserted at the crossing point. This will require further discussion with the Department of Water Resources, (there is another siphon taking the aqueduct beneath the Sierra Highway nearby).

Prior to Lake Palmdale, the HST enters the San Andreas Fault zone. The crossing of this fault must be essentially "at-grade", i.e. on low embankment, in shallow cut, or at-grade. As a result of this constraint and to avoid the need to put HST on a structure to cross the existing railroad, highway, or Lake Palmdale, the alignment of the Metrolink tracks and Sierra Highway must be realigned to run along the east side of the HST as far as the junction with the UPRR north of Avenue S. This will require some reconstruction of the southern end of the dam that creates Lake Palmdale, and may require some construction on the western edge of Una Lake. The intersection of the Sierra Highway and Avenue S will need to be lowered so that Avenue S passes beneath the HST.

North of the San Andreas Fault zone, the alignment continues at-grade within the West side of the UPRR right-of-way as far as Avenue R where a grade separated junction will need to be provided to pass over the HST. The alignment descends into a trench beneath Palmdale Blvd (SR 138). North of Palmdale Blvd the alignment levels out to accommodate the at-grade Palmdale Station alternative in the vicinity of the existing Metrolink Station.

At the north end of the station, where the Sierra Highway crosses the existing UPRR, Sierra Highway will need to be elevated to cross over the HST. The alignment continues at-grade through Palmdale, up to Avenue M at the Lancaster City limits.

Summary

- For this alternative acquisition of approximately 10 acres of the Angeles National Forest would be needed.
- The route has five (5) tunnels (10 portals) with a total tunnel length of approximately 20.8 miles. The longest individual tunnel is approximately 7.0 miles long.

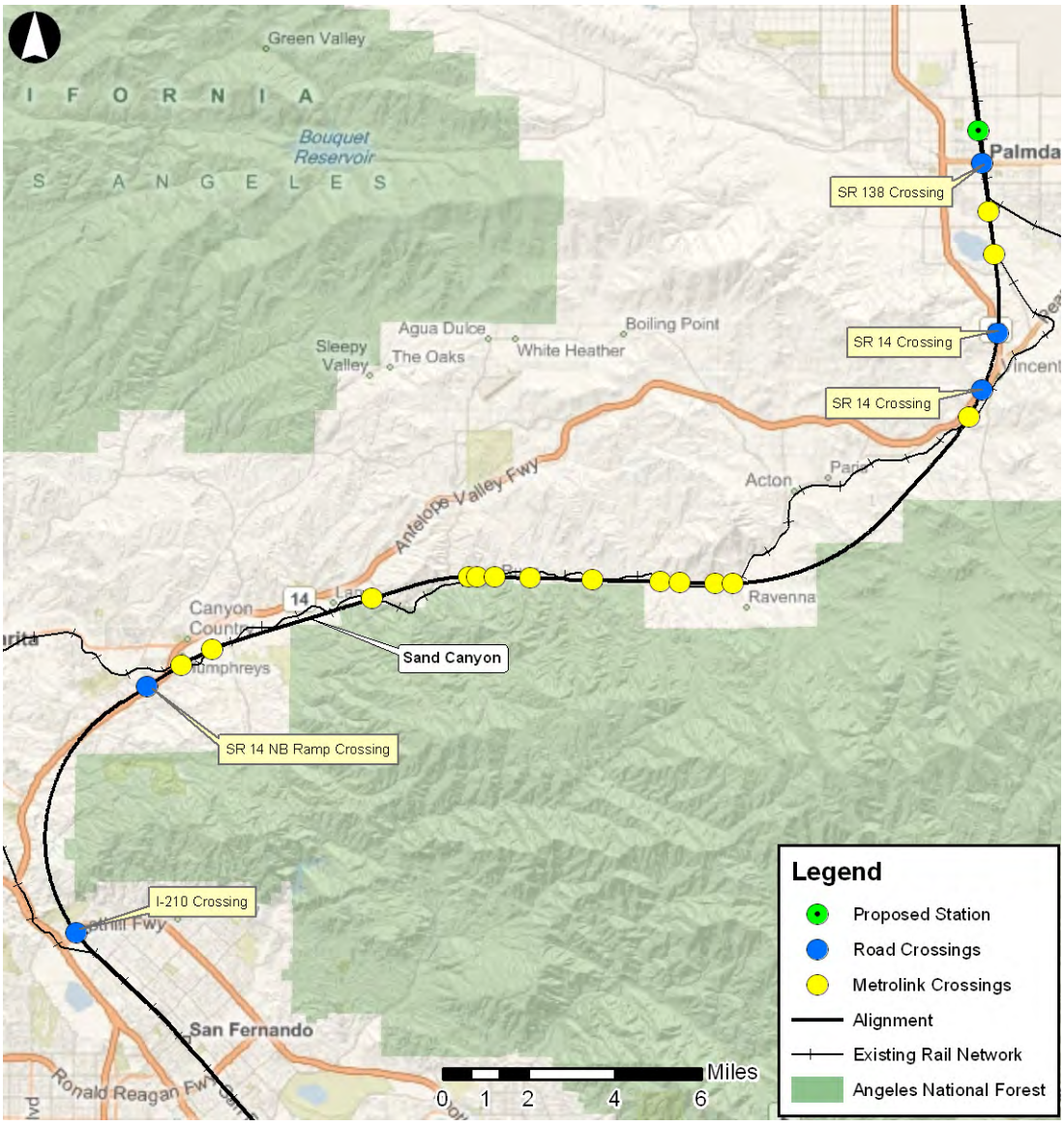
The crossings shown on Figure 4.6-5, and all crossings of major highways, rail operators, and local roadways between Sand Canyon and Palmdale are tabulated in Appendix B.

The SR 14 South Alternative would have the greatest length of tunnel and highest construction cost. Due to impact to developed properties, in the Acton area and elsewhere, this alternative **is withdrawn from further consideration**.

Soledad Canyon Alternative

The overall alignment is shown in Figure 4.6-6 below. Detailed drawings LAP-CB3404 to 3416 are included in Appendix D.

Figure 4.6-6 Soledad Canyon Alternative – Major Crossings



From Sand Canyon the Soledad Canyon alignment extends east, passing through the Lang Quarry in a series of cut sections and viaducts, ranging from 30 feet to 150 feet in height, and crossing Metrolink, Soledad Canyon Road and the Santa Clara River before entering a series of three tunnels for a distance of just less than two miles that takes the HST into the Soledad Canyon. There the alignment curves to the right and continues through Soledad Canyon on a series of viaducts and bridges for a distance of 6.5 miles, with multiple crossings of the existing Metrolink, Soledad Canyon Road, and the Santa Clara River.

Multiple sections of Soledad Canyon Road and/or the Metrolink railway may need to be rerouted, raised, or lowered to accommodate the Soledad Canyon alignment along this portion of the route. Extensive

earthwork would be required, cutting into existing slopes and forming embankments at some locations. Through this section, the alignment would cross the Santa Clara River approximately 28 times. Many of these crossings would be at skew angles and would require columns within the riverbed.

East of Bootleggers Canyon Road, the route curves northeast towards Soledad Pass, tunneling beneath the peaks to the south of Acton and crossing the Aliso Canyon on an 80-foot high viaduct. There is little impact to residential or commercial property within the Town of Acton. There are some impacts to local roads, and all crossings of major highways, rail operators, and local roadways are tabulated in Appendix B along with proposed improvements to mitigate these impacts.

At Vincent, the SR 14, Sierra Highway, and Metrolink converge to run together through the Soledad Pass, which the HST crosses on a skew bridge before entering one last tunnel on the northern part of the San Gabriel mountains as the alignment heads north towards Palmdale. As the route approaches the City of Palmdale, it emerges from tunnel and continues on embankment crossing over the California Aqueduct as it approaches the city.

The alignment passes through the San Andreas Fault zone south of Lake Palmdale. The crossing of this fault must be essentially "at-grade," i.e. on low embankment, in shallow cut, or at-grade. As a result of this constraint and to avoid the need to put HST on a structure to cross the existing railroad, highway, or Lake Palmdale, the alignment of the Metrolink tracks and Sierra Highway must be realigned to run along the east side of the HST as far as the junction with the UPRR north of Avenue S. This will require some reconstruction of the southern end of the dam that creates Lake Palmdale, and may require some construction on the western edge of Una Lake. The intersection of the Sierra Highway and Avenue S will need to be lowered so that Avenue S passes beneath the HST.

North of the San Andreas Fault zone, the alignment continues at-grade within the west side of the UPRR right-of-way as far as Avenue R where a grade separated junction will need to be provided to pass Avenue R over the HST. The alignment continues to descend to pass beneath Palmdale Boulevard (SR 138) in a trench (forcing Palmdale Boulevard to pass over the HST at the busy intersection with the Sierra Highway and 6th Street would be impractical). North of Palmdale Boulevard the alignment levels out to accommodate the Palmdale Station option in the vicinity of the existing Metrolink Station.

At the north end of the station, where the Sierra Highway crosses the existing UPRR, the highway will need to be elevated over the HST.

Summary:

- The Soledad Canyon alignment would traverse the Angeles National Forest (ANF) at the surface at Lang Quarry for approximately half mile in cut and through the Soledad Canyon along one edge of the forest boundary for approximately one mile on viaduct, and would result in a need acquire approximately 28 acres.
- The route has eight (8) tunnels (16 portals) with a total tunnel length of approximately 11.6 miles. The longest individual tunnel is approximately 7.0 miles long.
- In summary; the Soledad Canyon alignment alternative crosses Soledad Canyon Road twelve times, Santa Clara River fifteen times, and Metrolink thirteen times.

The crossings between Sand Canyon and Palmdale for this alternative are tabulated in Appendix B.

The Soledad Canyon Alternative has the longest route length and longest journey time, but it has one of the lowest construction costs. It has the shortest total length of tunnels but the longest viaduct length. It has the most impacts to existing Metrolink rail line and most geotechnical constraints, constructability issues, and environmental impacts through the Soledad Canyon area. It takes the largest area of Angeles National Forest of any of the alternatives. It was recommended not to be considered further by U.S. Army Corps of Engineers and U.S. Environmental Protection Agency, who have written to the Authority confirming their belief that the other three alignments being studied provide a much greater opportunity to find the Least Environmentally Damaging Practicable Alternative along this segment and so this alternative **is withdrawn from further consideration**.

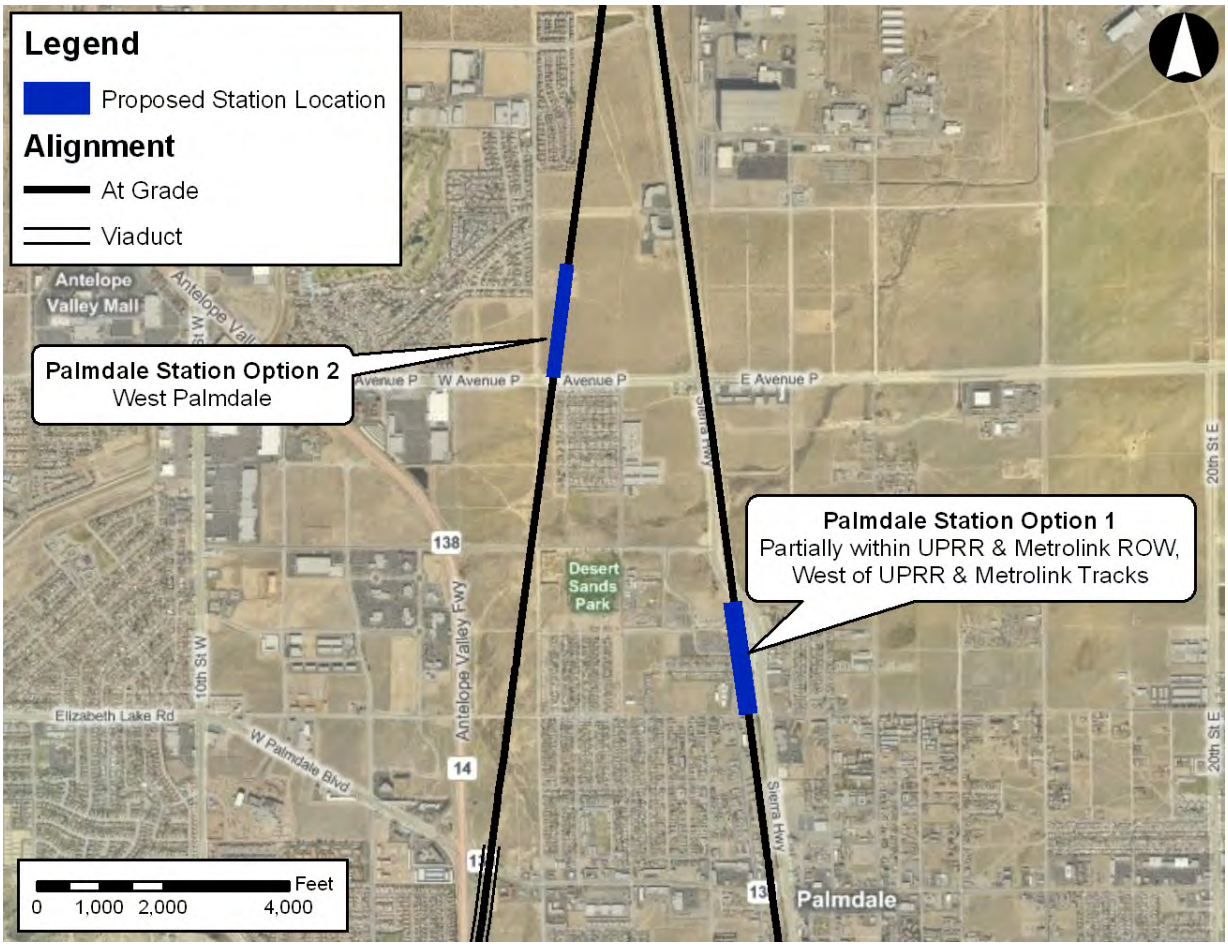
4.6.2 Evaluation of Palmdale Station Options

Two platforms 1,380 foot-long on gradients not steeper than 0.25%, and four tracks extending over a length of 6000' are necessary to accommodate the HST at Palmdale station.

Due to alignment variations associated with the four alignment alternatives, two locations are considered for Palmdale station: Option 1 for the Soledad Canyon, SR 14 East, and SR 14 South Alternatives and a more westerly option (Option 2) for the SR 14 West Alternative.

The location options are illustrated in Figure 4.6-7. It should be noted that Figure 4.6-7 is only indicative of the general station locations. Station specifics will depend on detailed consideration of transportation links, development opportunities, and other factors as the design develops.

Figure 4.6-7 Palmdale Station options



Palmdale Station Option 1 (for Soledad Canyon, SR 14 East, & SR 14 South Alternatives)

Palmdale Station Option 1 proposes an at-grade station abutting the west side of the Union Pacific Railroad (UPRR) and the Metrolink right-of-way between Avenue Q and Technology Drive and partially located within the existing UPRR and Metrolink right-of-way. This would require significant right-of-way acquisition from both rail agencies and reconstruction of Sierra Highway north of the proposed HST station location. This option would require partial acquisition of the right-of-way on the industrial strip of land between 6th Street and the UPRR right-of-way. Right-of-way acquisition and horizontal realignment of Sierra Highway north of the HST station location and changes to the Rancho Vista Boulevard/Avenue P grade separation over Sierra Highway currently being designed for the City of Palmdale would not be necessary. The E. Palmdale Boulevard intersection would require reconstruction to a grade-separated crossing going over HST, Metrolink, and UPRR. Similarly, the Sierra Highway intersection just north of the HST station would require reconstruction to a grade-separated crossing going over HST, Metrolink, and UPRR, and the northern end of 6th Street would require horizontal realignment. Figure 4.6-8 shows a cross section of the existing layout at the proposed Palmdale station location, Figure 4.6-9 shows a

cross section of this proposed station layout. Option 1 is the only viable station option for Soledad Canyon, SR 14 East, and SR 14 South alignments and so **is carried forward for further consideration**.

Figure 4.6-8 Existing Layout at the Proposed Palmdale Station Option 1 Location

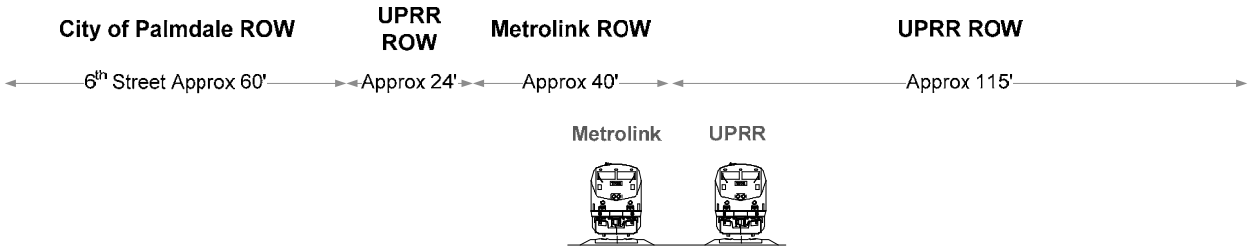
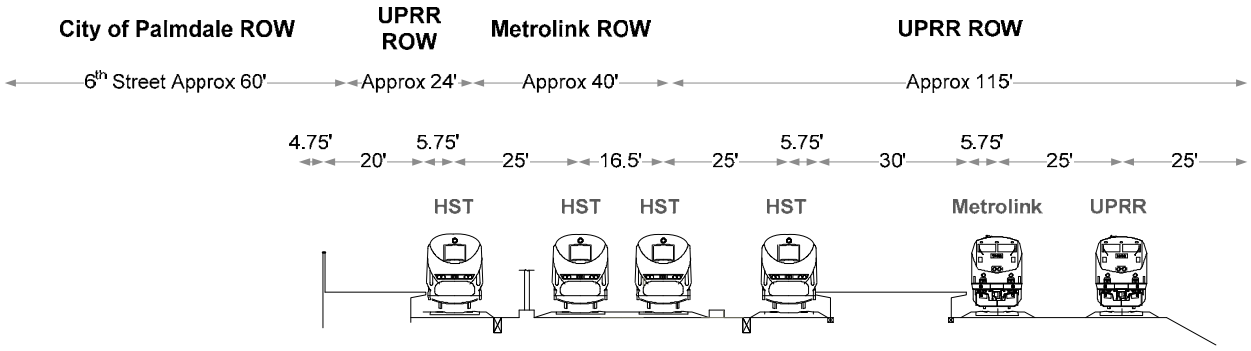


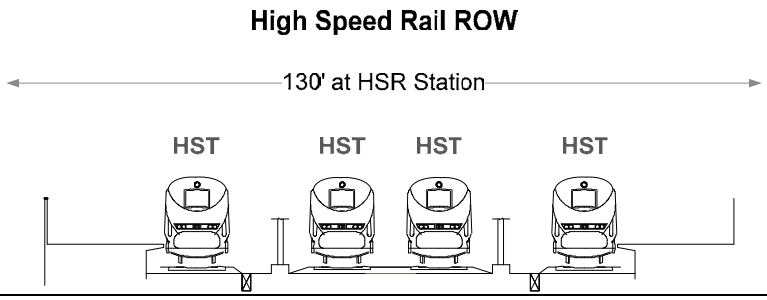
Figure 4.6-9 Proposed Layout of the Palmdale Station Option 1



Palmdale Station Option 2 (for SR 14 West Alternative)

Palmdale Station Option 2 proposes to locate an at-grade station on open parcels approximately 2,000 feet west of Sierra Highway. The southern end of the station would be just north of E. Avenue P, which would provide a direct connection between the HST station and the Palmdale Airport. Crossings at SR 14, Technology Drive, and E. Avenue P would require reconstruction to be grade-separated from the HST. Figure 4.6-10 shows a cross section of this proposed station option. Option 2 is the only viable station option for SR 14 West alignment and so **is carried forward for further consideration**.

Figure 4.6-10 Proposed Layout for Palmdale Station Option 2



5. ANALYSIS SUMMARY AND CONCLUSIONS

Chapter 5 documents the conclusions and decisions regarding which alignment alternatives, station locations and design options should be carried forward for analysis in the EIR/EIS based on the results of the Alternatives Analysis (AA) process, including input from agencies, other stakeholders and the public. It documents the final step in the alternatives analysis process: Identification of Alternatives to be Carried Forward for Evaluation in the EIR/EIS.

5.1 Alignment Alternatives, Station Locations and Design Options to be Carried Forward to EIR/EIS

Table 5.1-1 and Figure 5.1-1 identify the alignment alternatives, station locations and design options to be carried forward for analysis in the EIR/EIS. The table summarizes by alignment alternative within each subsection the proposed decisions regarding the withdrawal or carrying forward of the alignment into the EIR/EIS. Solid lines on the figure indicate that the alignment alternative is to be carried forward. Dashed lines indicate that the alignment is withdrawn. The recommendations of the Preliminary Alternatives Analysis Report are summarized below.

5.1.1 LAUS to Metrolink CMF Subsection

For the LAUS to Metrolink CMF subsection, five alignment alternatives were identified for comparison against the evaluation measures:

- LAPT1
- LAPT2
- LAPT3
- LAP1A
- LAP1B

The performance of the five alignment alternatives against the evaluation measures is described below.

Alternative LAPT1 - An alignment originating from an at-grade HST station at LAUS that includes a tunnel between Spring Street and Metrolink CMF with a cut and cover section through Los Angeles State Historic Park (LASHP). Though the surface would be fully restored upon completion, cut-and-cover construction for Alternative LAPT1 would cause temporary disruption across LASHP, and affect the archaeological site which is currently being excavated. The work could be staged to maintain use in unaffected portions of the park by managing the size of the work zone. After completion this alternative would have minimal effect on the LASHP as it passes beneath it in tunnel. This alignment **is carried forward for further consideration** because it is the shortest, has the shortest journey time, and has permanent impacts localized in a small area north of LAUS.

Alternative LAPT2 – An alignment originating from an at-grade or elevated HST station at LAUS that includes a tunnel between Broadway and Metrolink CMF. It runs between the Gold Line and Broadway and is not compatible with Metro plans for Gold line storage tracks in this area. It would require cut and cover construction across Broadway, disrupting traffic flow during construction. While this alignment would not directly affect the LASHP, the viaduct running alongside it would have a permanent visual and

noise impact on the users of the park. Alternative LAPT2 **is carried forward for further consideration** because it gives the opportunity for reduced impacts from a tunnel alignment to be compatible with an elevated LAUS option.

Alternative LAPT3 - An alignment originating from an at-grade HST station at LAUS that includes a tunnel between Spring Street and Metrolink CMF passing beneath Los Angeles State Historic Park in bored tunnel. This alternative would have minimal effect on the LASHP as it passed beneath it in bored tunnel. However it would be likely to require displacement of the Raphael Junction Block Building which was built in 1889 and designated a Historic Cultural Monument in 2007. This alignment **is carried forward for further consideration**.

Alternative LAP1A - An alignment originating from an elevated or at-grade HST station at LAUS which runs above the Metrolink tracks on viaduct to cross the Los Angeles river and run on viaduct and at-grade on the east bank to Metrolink CMF. It would displace the historically and culturally valued San Antonio Winery and has the potential to indirectly impact portions of other historic-period properties as a result of noise and vibration from construction and during operation. It would be particularly complex to construct because of the viaducts running above the Metrolink tracks including the Los Angeles River crossing. The need to rise on viaduct above Main Street, Spring Street and Broadway on the east bank of the Los Angeles River to preserve the historic bridges would render Alternative LAP1A visually intrusive and a source of noise. This alternative is on a high viaduct near multi-family dwelling units close to LAUS and beside a church, recreation center and historic jail on the east bank. This alignment is unacceptable to some stakeholders. This alignment has the longest journey time because of the tight curves needed. Alternative LAP1A **is withdrawn from further consideration** for these reasons.

Alternative LAP1B - An alignment originating from an elevated or at-grade HST station at LAUS that would follow Main Street on viaduct then run along the west bank of the Los Angeles river on viaduct and at-grade, crossing the river at the existing Metrolink bridge beneath the SR 110 viaduct. The viaduct over Main Street would be visually intrusive and have significant noise and vibration impacts on multi-family dwelling units. The viaduct crossing over the historic Spring Street and Broadway bridges would be visually intrusive. The at grade section on the west bank of the river, and in particular the extreme skew crossing of the Los Angeles river at the location of the existing Metrolink river crossing, would cause severe disruption to Metrolink services and the Gold Line yard. Connection from the Metrolink tracks to the south end of the Metrolink CMF would be permanently severed. For these reasons Alternative LAP1B **is withdrawn from further consideration**.

Alternative LAP1C - An alignment originating from an elevated or at-grade HST station at LAUS which runs above Main Street on viaduct then cross the river just north of Main Street bridge to the east bank of the Los Angeles river and follow the Metrolink tracks to Metrolink CMF. The viaduct over Main Street would be visually intrusive and have significant noise and vibration impacts on multi-family dwelling units. It has the potential to indirectly impact portions of other historic-period properties as a result of noise and vibration from construction and during operation. The need to rise on viaduct beside the historic Main Street bridge and over the historic Spring Street and Broadway bridges on the east bank of the Los Angeles River would render Alternative LAP1C visually intrusive and a source of noise. This alternative is on a high viaduct beside a church, recreation center and historic jail on the east bank of the river. This alignment has one of the longest journey times because of the tight curves needed. Alternative LAP1C **is carried forward for further consideration** because it does not impact LASHP, and is compatible with an elevated or at-grade LAUS station.

5.1.2 Metrolink to SR 2 Subsection

For the Metrolink CMF to SR 2 subsection, three alignment alternatives were identified for comparison against the evaluation measures:

- Metrolink Alignment at-grade
- Metrolink Alignment in trench
- San Fernando Road Alignment in trench

The performance of the three alignment alternatives against the evaluation measures is described below.

Metrolink alignment at-grade alternative would curve along the west side of Rio de Los Angeles State Park. This is only compatible with alignments LAP1A, LAP1B and LAP1C. The curves on this alternative limit speed to 60mph and increase journey time by about 50 seconds compared with the San Fernando Road Alignment. The Metrolink at-grade alternative introduces a new barrier between the Rio de Los Angeles State Park and the Los Angeles River and noise impacts on users of the Park and on the new high school campus would be significant. For these reasons this alternative **is withdrawn from further consideration**.

Metrolink alignment trench alternative would be in the existing Metro right-of-way in a partially covered trench along the west side of the Rio de Los Angeles State Park. The curves on this alternative limit speed to 60mph and increase journey time by about 50 seconds compared with the San Fernando Road Alignment. For the tunnel alternatives the portal would be part of the way along the Rio de Los Angeles State Park. By taking a more direct line from the north end of the high school and accepting some industrial displacements, the journey time penalty for this alternative can be reduced to 10 seconds. This alternative **is carried forward for further consideration** because it has least impact on RDLASP

San Fernando Road alternative would run alongside San Fernando Road in a partially covered trench on the east side of the Rio de Los Angeles State Park. This alignment has a direct affect on RDLASP, reducing its area. To mitigate this, the HST tracks would be in a partially covered trench for lengths of up to 800 feet (based on ventilation and emergency evacuation considerations). The profile would climb out of the trench beyond Division Street, requiring a number of industrial displacements, to pass under SR 2 at-grade. This option **is carried forward for further consideration** because it offers journey time advantages.

5.1.3 SR2 to Sylmar Subsection

For the SR 2 to Sylmar subsection HST will run predominately at grade within the existing Metrolink/UPRR railroad corridor, sharing the right-of-way, with the dedicated HST tracks placed to the east of the Metrolink/freight tracks (alignment ESS). This alignment would allow for progressively increasing speeds to the north as it follows the existing Metrolink/UPRR corridor. Four profiles were identified for comparison against the evaluation measures in this subsection:

- Profile A
- Profile B1
- Profile B2

- Profile C

In addition, four station location options were identified for comparison against the evaluation measures:

- Burbank Buena Vista Station
- Branford Street Station
- Pacoima Wash Station
- San Fernando Station

The performance of the four profiles against the evaluation measures is described below.

PROFILES

Elevated Profile A – HST would be selectively elevated to create grade separations. Elevated portions of the vertical alignment would be predominantly carried on a viaduct structure. The elevated profile would require minimal alterations to the existing road network and therefore would not be expected to necessitate right-of-way acquisition or displacements beyond those required by the choice of horizontal alignment and station location. In certain locations constraints, such as elevated highways and freeways crossing over the existing rail line, airport clearance requirements and seismic faults, rule out the elevated profile. The potential for elevating the Metrolink/freight tracks along with the HST tracks will be evaluated with the railroad operators during preliminary design. The main benefit from elevating both is the elimination of existing at-grade crossings, which are a constraint on road traffic and have a poor safety record, and also constrain rail speeds and operations. The elevated profile would create the most visual and noise impacts, but would provide significant advantages with respect to displacements and improvements to traffic flow and so **is carried forward for further consideration**.

At-grade Profile B1 –Roads would be elevated to cross over the at-grade HST. Many of the road realignments would require right-of-way acquisition and some would require property displacements involving commercial entities, but could extend into residential areas. Where at-grade crossings are close to each other, disruption could affect an area for an extended period while each crossing was grade separated in turn. This profile would also permanently disrupt traffic flow by breaking the link between San Fernando Road and arterials crossing the rail right-of-way, requiring new connections back to San Fernando Road in some cases. The at-grade profile with elevated cross streets would be generally easiest and least costly to construct and so **is carried forward for further consideration**.

At-grade Profile B2 – Roads would be depressed to cross under the at-grade HST. Many of the road realignments would require right-of-way acquisition and some would require property displacements involving commercial entities, but could extend into residential areas. Where at-grade crossings are close to each other, disruption could affect an area for an extended period while each crossing was grade separated in turn. This profile would also permanently disrupt traffic flow by breaking the link between San Fernando Road and arterials crossing the rail right-of-way, requiring new connections back to San Fernando Road in some cases. Cut areas are expected to cause extensive utility diversion or relocation. This profile would be more complex and costly than elevating the cross streets. Because the clearance required between road and rail is less for this profile than for profile (B1) it will require shorter ramps which can have advantages for traffic flow and displacements in some situations, and so **is carried forward for further consideration**.

Trench Profile C – HST would be selectively depressed to create grade separations. Metrolink have indicated that Metrolink/freight tracks may not be able to share a trench with HST because of equipment and operational incompatibilities, and so they would likely remain at-grade and the benefit from removing existing at-grade crossings would be lost. A depressed alignment is not a viable solution at crossings under elevated freeways and major arterials or under major drainage structures. There would be significant impacts on gravity storm water and sewage systems that traverse the HST path. Where airport flight clearances would clash with the OCS for the HST this alternative may be the only viable solution and so it **is carried forward for further consideration**, but is likely only to be adopted in such locations.

STATION LOCATION OPTIONS

A single station between LAUS and Palmdale will be located at one of the following locations:

Alternative BVS – Burbank Buena Vista Site - The Burbank Buena Vista station site would be located between North Buena Vista Street and Hollywood Way in the City of Burbank. The site is located within the Golden State Redevelopment Project area which is mostly comprised of industrial and heavy commercial uses. The station platforms would be on a low embankment. There is the potential to link the HST station with the Burbank Airport and its planned transit center, 1.5 miles away. This location therefore offers the best potential for broadened intermodal connectivity. This option **is carried forward for further consideration** because it is favored by the City of Burbank.

Alternative BSS – Branford Site - The Branford Street Station site would be located between Branford Street and Osborne Street in Los Angeles/Pacoima. The surrounding area features broadly mixed use. The area south of Branford Street is dominated by quarries and Los Angeles County water retention ponds (used for ground water recharge and to reduce peak flood flows in Tujunga Wash). The disused quarry can be filled in (the HST project will generate significant volumes of soil suitable for filling) and this can create an opportunity for development. The station platforms would be on low embankment. The Verdugo fault, which is potentially active, runs parallel to and close to the alignment in this area. This option **is carried forward for further consideration** because it has fewer impacts on adjacent properties.

Alternative PWS – Pacoima Site - The Pacoima Wash Station site would be located between SR 118 and Pacoima Wash in Los Angeles/Pacoima. The HST track alignment is constrained by the Pacoima Wash north of the platforms and the SR 118 freeway bridge to the south of the platforms. To be at-grade the platforms would need a 1% gradient which does not meet the engineering requirements for station platforms. To achieve acceptable gradients for the station platforms, the HST tracks would need to be on a high viaduct about 3 miles long and up to 60 feet high, with heavy through truss girders for the long span over the freeway. The viaduct south of the freeway would extend into the Verdugo Fault zone. The station platforms would be approximately 60 feet above grade. The City Redevelopment Agency considers this area as a potential re-development region. This option **is carried forward for further consideration** because it is favored by the City of Los Angeles and the City Redevelopment Agency.

Alternative SFS – Sylmar / San Fernando Site - The Sylmar / San Fernando station location alternative would be located between Hubbard Street and Maclay Avenue in the City of San Fernando. The station site is located in an area proposed for revitalization as part of the San Fernando Corridors Specific Plan. However, the amount of available space for new development is still fairly limited given the

proximity of single family residential homes to the east and the existing street network in the area. To accommodate a station the HST tracks need to be west of the existing right-of-way, requiring significant commercial displacements. This option **is carried forward for further consideration** because it is favored by the City of San Fernando

5.1.4 Sylmar to Palmdale Subsection

For the Sylmar to Palmdale subsection, four alignment alternatives were identified for comparison against the evaluation measures:

- SR 14 East
- SR 14 West
- SR 14 South
- Soledad Canyon

In addition, two station location options were identified for comparison against the evaluation measures:

- Palmdale Option 1
- Palmdale Option 2

The performance of the four alignment alternatives against the evaluation measures is described below.

ALIGNMENT ALTERNATIVES

SR 14 East alternative does not significantly cross the Angeles National Forest. It crosses lands belonging to the Bureau of Land Management for a total of 1.9 miles. The route has five tunnels (10 portals) with a total tunnel length of approximately 19 miles. The longest individual tunnel is approximately 7.0 miles long. The SR 14 East Alternative has the lowest potential for impacts to residential, commercial and industrial properties, and so **is carried forward for further consideration.** It has neither the highest nor lowest construction cost. It has no impact to parks, but it encroaches into one school in the Acton area.

SR 14 West Alternative does not significantly cross the Angeles National Forest. The route has five tunnels (10 portals) with a total tunnel length of approximately 16.7 miles. The longest individual tunnel is approximately 7.0 miles long. The SR 14 West Alternative has the shortest route length and shortest journey time and so **is carried forward for further consideration**. This alternative is also expected to be the least expensive. It has the highest structures (up to 200-feet high). It impacts one school and one park in Palmdale.

SR 14 South Alternative will take approximately 10 acres of the Angeles National Forest. The route has five tunnels (10 portals) with a total tunnel length of approximately 20.8 miles. The longest individual tunnel is approximately 7.0 miles long. The SR 14 South Alternative has the greatest length of tunnel and highest construction cost. It has the highest impact to developed properties, particularly in the Acton area and so is **withdrawn from further consideration**.

Soledad Canyon Alternative The Soledad Canyon alignment traverses through the Angeles National Forest (ANF) at the surface at Lang Quarry for a half mile in cut and through the Soledad Canyon along one edge of the forest boundary for one mile on viaduct, taking about 28 acres in total. All other

crossings of the park are in tunnel. The route has eight tunnels (16 portals) with a total tunnel length of approximately 11.6 miles. The longest individual tunnel is approximately 7.0 miles long. The Soledad Canyon alignment alternative crosses Soledad Canyon Road twelve times, Santa Clara River fifteen times, and Metrolink thirteen times. The Soledad Canyon Alternative has the longest route length and longest journey time, but it has one of the lowest construction costs. It has the shortest total length of tunnels but the longest viaduct length. It has the most impacts to existing Metrolink rail line and most geotechnical constraints, constructability issues, and environmental impacts through the Soledad Canyon area. It takes the largest area of Angeles National Forest of any of the alternatives. It was recommended not to be considered further by U.S. Army Corps of Engineers and U.S. Environmental Protection Agency, who have written to the Authority confirming their belief that the other three alignments being studied provide a much greater opportunity to find the Least Environmentally Damaging Practicable Alternative along this segment and so this alternative **is withdrawn from further consideration**.

STATION LOCATION OPTIONS

Palmdale Station Option 1 (for Soledad Canyon, SR 14 East, & SR 14 South Alternatives)

Palmdale Station Option 1 proposes an at-grade station abutting the west side of the Union Pacific Railroad (UPRR) and the Metrolink right-of-way between Avenue Q and Technology Drive and partially located within the existing UPRR and Metrolink right-of-way. This would require significant right-of-way acquisition from both rail agencies and reconstruction of Sierra Highway north of the proposed HST station location. This option would require partial acquisition of the right-of-way on the industrial strip of land between 6th Street and the UPRR right-of-way. Right-of-way acquisition and horizontal realignment of Sierra Highway north of the HST station location and changes to the Rancho Vista Boulevard/Avenue P grade separation over Sierra Highway currently being designed for the City of Palmdale would not be necessary. The E. Palmdale Boulevard intersection would require reconstruction to a grade-separated crossing going over HST, Metrolink, and UPRR. Similarly, the Sierra Highway intersection just north of the HST station would require reconstruction to a grade-separated crossing going over HST, Metrolink, and UPRR, and the northern end of 6th Street would require horizontal realignment. Option 1 is the only viable station option for Soledad Canyon, SR 14 East, and SR 14 South alignments and so **is carried forward for further consideration**.

Palmdale Station Option 2 (for SR 14 West Alternative)

Palmdale Station Option 2 proposes to locate an at-grade station on open parcels approximately 2,000 feet west of Sierra Highway. The southern end of the station would be just north of E. Avenue P, which would provide a direct connection between the HST station and the Palmdale Airport. Crossings at SR 14, Technology Drive, and E. Avenue P would require reconstruction to be grade-separated from the HST. Option 2 is the only viable station option for SR 14 West alignment and so **is carried forward for further consideration**.

Figure 5.1-1 Alignment and Station Alternatives

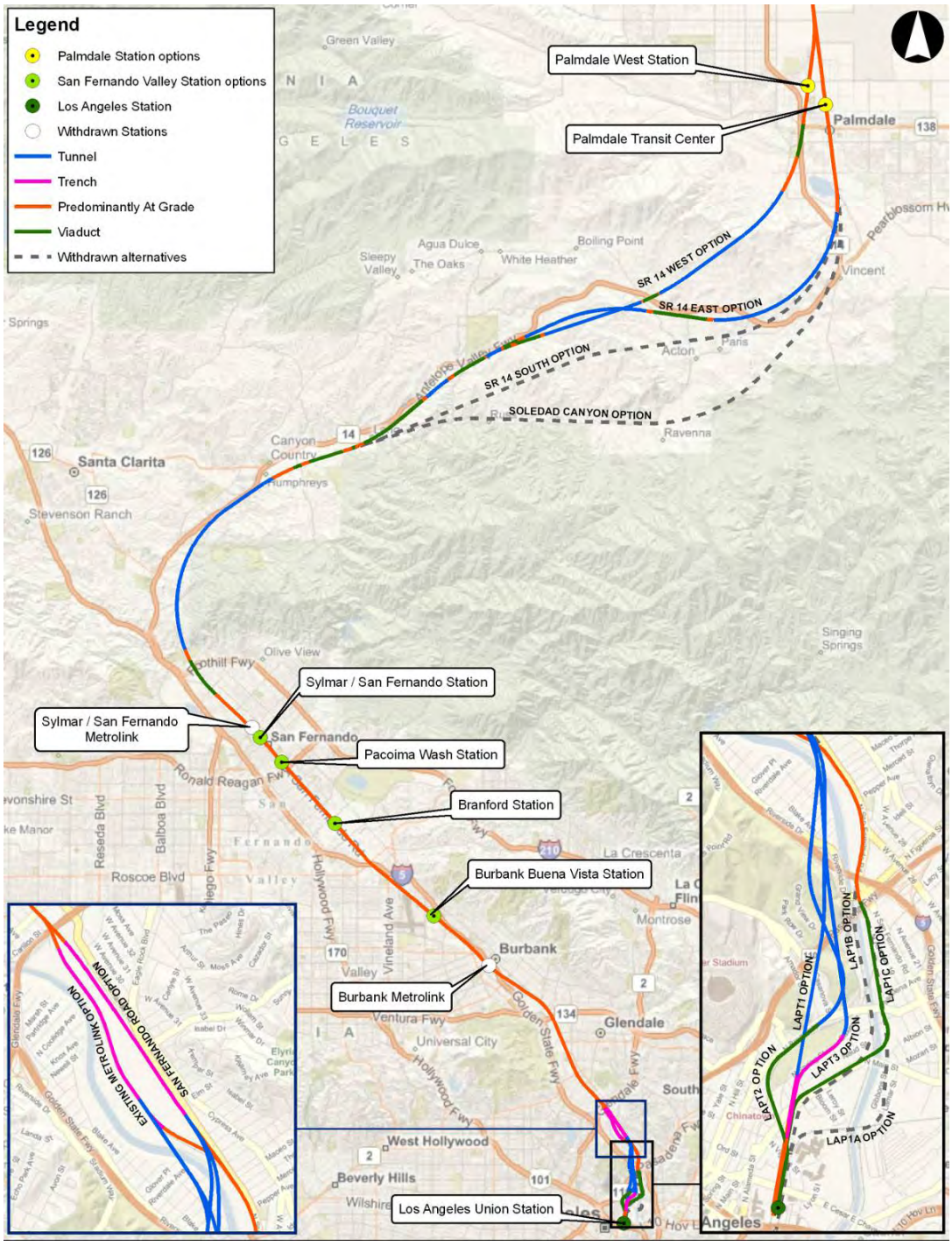


Table 5.1-1 Alternatives Evaluation Summary

ALIGNMENT ALTERNATIVE/STATION LOCATION AND DESIGN OPTIONS	AA DECISION		REASONS FOR ELIMINATION (P–Primary S–Secondary)							ENVIRONMENTAL/OTHER CONCERNS
	Carried Forward	Withdrawn	Construction	Incompatibility	Right-of-Way	Connectivity/ Accessibility	Revenue/ Ridership	Community Impact	Environment	
LAUS to Metrolink CMF										
LAPT1	X									Impact to Los Angeles State Historic Park (LASHP); Only compatible with at-grade LAUS; Business displacements; Residential/business/institutional subsurface easements; Construction costs.
LAPT2	X									Runs alongside LASHP on viaduct; Business displacements; Residential/business/institutional subsurface easements; Visual resources; Construction impacts and costs.
LAPT3	X									Adjacent to LASHP; Only compatible with at-grade LAUS; Business/institutional displacements; Residential/business/institutional subsurface easements; Cultural resources; Construction costs
LAP1A		X	S					S	P	Residential/business/institutional displacements; Cultural and visual resources; Very low speed curves leaving Union Station; Constructability over existing rail lines.

ALIGNMENT ALTERNATIVE/STATION LOCATION AND DESIGN OPTIONS	AA DECISION		REASONS FOR ELIMINATION (P–Primary S–Secondary)							ENVIRONMENTAL/OTHER CONCERNS
	Carried Forward	Withdrawn	Construction	Incompatibility	Right-of-Way	Connectivity/ Accessibility	Revenue/ Ridership	Community Impact	Environment	
LAP1B		X	S	P	S	S		S		Construction impacts to existing railroads; Impacts access to Metrolink CMF; Disruption to Gold Line Yard during construction and reduced access on completion; Residential/business/institutional displacements; Visual resources; Low speed curves leaving Union Station; Constructability of skewed, long-span Los Angeles River crossing under existing freeway bridges.
LAP1C	X									Residential/business/institutional displacements; Cultural and visual resources; Low speed curves leaving Union Station.
Metrolink CMF to SR 2										
Metrolink Alignment, At-grade		X		P		S			S	Not compatible with LAPT1, LAPT2 or LAPT3 alternatives; Reduced design speed. Connectivity between the Rio de Los Angeles State Park and the Los Angeles River; Impact to existing railroad; Visual impact; Business displacements.
Metrolink Alignment, in Trench	X									Reduced design speed; Connectivity between RDLASP and the Los Angeles River can be mitigated by bridging trench; Impact to existing railroad; Business displacements.
San Fernando Road Alignment, in Trench	X									Impact on Rio de Los Angeles State Park; Business displacements; Impact to Central Region High School No. 13.

ALIGNMENT ALTERNATIVE/STATION LOCATION AND DESIGN OPTIONS	AA DECISION		REASONS FOR ELIMINATION (P–Primary S–Secondary)							ENVIRONMENTAL/OTHER CONCERNS
	Carried Forward	Withdrawn	Construction	Incompatibility	Right-of-Way	Connectivity/ Accessibility	Revenue/ Ridership	Community Impact	Environment	
SR 2 to Sylmar										
Alignment ESS Metrolink/UPRR Profile Alternatives										
Profile A – at grade with HST elevated over selected grade crossings	X									Not viable close to existing overbridges; Impact to existing railroad; Visual resources; Noise and vibration; Construction cost, particularly if Metrolink/freight is also elevated at the same time.
Profile B1 – at grade with roads elevated over selected grade crossings	X									Residential/business displacements and access; Impact to existing railroad; Traffic impacts; Visual resources.
Profile B2 – at grade with roads depressed under selected grade crossings	X									Residential/business displacements and access; Impact to existing railroad; Traffic impacts; Existing utilities; Operating cost.
Profile C – at grade with HST depressed under selected grade crossings	X									Only used where other options are not viable (adjacent to airports); Not viable close to existing overbridges or underbridges; Impact to existing railroad; Existing utilities; Constructability; Construction and operating cost.

ALIGNMENT ALTERNATIVE/STATION LOCATION AND DESIGN OPTIONS	AA DECISION		REASONS FOR ELIMINATION (P–Primary S–Secondary)							ENVIRONMENTAL/OTHER CONCERNS
	Carried Forward	Withdrawn	Construction	Incompatibility	Right-of-Way	Connectivity/ Accessibility	Revenue/ Ridership	Community Impact	Environment	
Station Alternatives (for a Single HST Station in San Fernando Valley)										
Burbank Metrolink Station		X	S		P			P		Programmatic location, would need to leave the right-of-way for a length of several miles to satisfy design criteria; Freeway connectivity; Residential/business displacements; Noise and vibration; Constructability; Construction cost.
Burbank Buena Vista Alternative BVS	X									Business displacements; Traffic impacts and freeway connectivity; Noise and vibration; Hazardous materials.
Branford Alternative BSS	X									Adjacent water recharge ponds; Business displacements; Biological resources; Hazardous materials.
Pacoima Wash Alternative PWS	X									Elevated (60 feet above ground) station with long span bridge over freeway; Business displacements; Visual resources; Noise and vibration; Construction cost.
Sylmar/San Fernando Alternative SFS	X									Station outside Metrolink right-of-way to comply with design criteria; Constrained TOD potential; Business displacements. Cultural resources; Noise and vibration.
Sylmar/San Fernando Metrolink Station		X		P						Programmatic location, not compatible with need to cross active faults at grade - withdrawn

ALIGNMENT ALTERNATIVE/STATION LOCATION AND DESIGN OPTIONS	AA DECISION		REASONS FOR ELIMINATION (P–Primary S–Secondary)							ENVIRONMENTAL/OTHER CONCERNS
	Carried Forward	Withdrawn	Construction	Incompatibility	Right-of-Way	Connectivity/ Accessibility	Revenue/ Ridership	Community Impact	Environment	
Sylmar to Palmdale										
Alignment Alternatives										
Soledad Canyon		X	S		S	S			P	Longest route length and journey time; Impacts Angeles National Forest; Crosses Cemex mineral rights granted by Bureau of Land Management; Impacts to Lake Palmdale dam/ Una lake and adjacent road and railroad; Disruption to existing railroads; Residential/business displacements; Biological resources.
SR 14 East	X									Impacts to Lake Palmdale dam/ Una lake and adjacent road and railroad; Residential/business displacements;
SR 14 South		X	S			S		P	S	Impacts Angeles National Forest; Siphon on California Aqueduct; Crosses Cemex mineral rights granted by Bureau of Land Management; Impacts to Lake Palmdale dam/ Una lake and adjacent road and railroad; Residential/business displacements; Visual resources; High capital cost; Community concerns
SR 14 West	X									Siphon on California Aqueduct; Residential/business displacements;
Station Options (for a Single Station in Palmdale)										
Option 1, East, Partially Within Right-of-Way	X									Compatible with SR 14 East alignment.
Option 2, West	X									Compatible with SR 14 West alignment